

Machine and Tool

# BLUE BOOK

an interview with:

**HENRY VISCARDI**  
**ABILITIES, INC.**

*"How disabled a man is  
isn't nearly as important  
as whether he wants to  
work or not."*

see page 102



also: Charlie Wick Starts His Series on Chipless Machining

## CAN YOUR SHEAR PERFORM

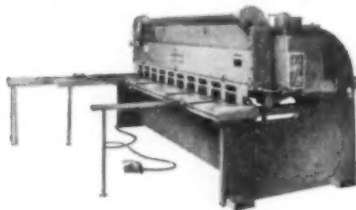
*the Lodge & Shipley "Nickel Trick"?*



*... unequalled holding power,  
but ... NO IMPACT ... NO MAR  
... NO NOISE ... with exclusive ...*

So vibration-free a nickel balances easily right above air-hydraulic holddowns applying tons of pressure, that's the Lodge & Shipley Shear feature demonstrated by the "nickel trick". Sof-Loc Hold-down gives positive holding power without damage to the most easily marred material.

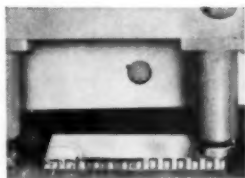
Available in capacities from 10 gauge to  $\frac{3}{8}$  inch, Lodge & Shipley Shears are built for heavy duty and high production shearing with almost a score of features vital to economical operation. Almost all of these features are included in the low base price whereas they're "extras" on comparable machines. The many advantages of Lodge & Shipley Shears are described in a new 20-page catalog. Request Bulletin S-347 from The Lodge & Shipley Co., 3074 Colerain Ave., Cincinnati 25, Ohio.



*for shear  
excellence,  
choose ...*

# Sof-Loc\*

HYDRAULIC  
HOLDDOWN SYSTEM



Adjustable for pressure and speed,  
Sof-Loc Holddowns eliminate  
impact and damage.

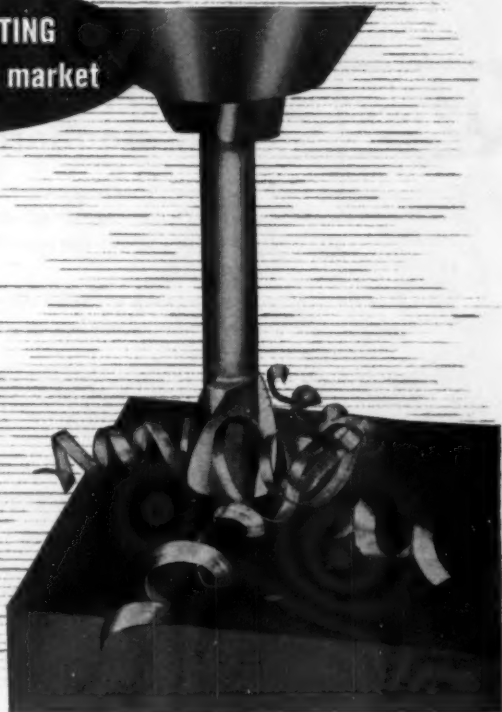
## Lodge & Shipley

\*PATENTED, TRADEMARK REGISTERED

**The FREEST CUTTING  
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**Now—designed for  
new "1960 SERIES"  
socket head cap screw  
standards**

**OVER 40 YEARS  
OF LEADERSHIP  
SINCE 1918**



# **WELDON "TU-LIP" COUNTERBORES**

**Cut production costs and stay sharp longer because:**

- Ample chip room prevents breakage caused by clogging
- Solid pilot without grooves will not ream or mar the hole
- Fast helix of the two flutes results in improved cutting action
- Only two cutting lips to regrind, cuts tool room sharpening time



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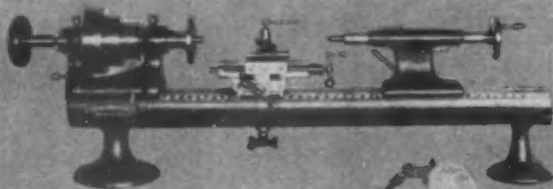
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# 1872 . . . . . 1961

## **Wade** LATHES have always met the standards of the times

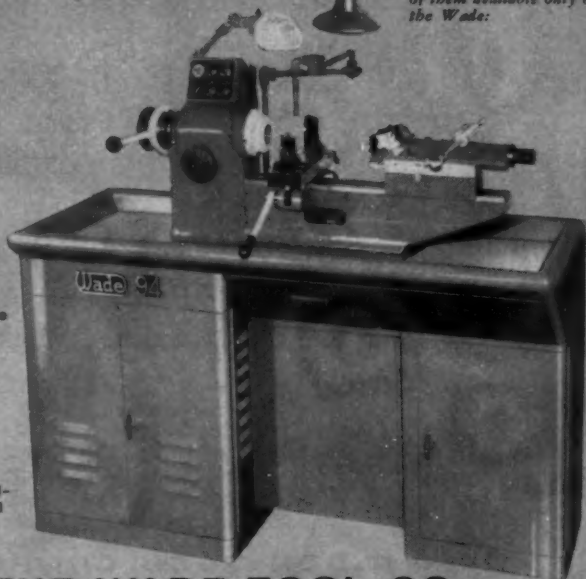
There's a real plus-factor for the user, in the long life and business continuity of the builder of a machine tool. The tool always has the original manufacturer behind it . . . to fulfill a guarantee, to supply parts and accessories, to see that it continues to operate and make money for the owner.

If you're interested in knowing more about this well-designed, modern lathe, with more than 88 years of integrity behind it, write for our new brochure on the **Wade No. 94 Lathe**.



*This No. 3 lathe was modern in 1872 and is No. 94 today, with its many desirable features — some of them available only on the Wade:*

- Turns true to .000040"
- Electric clutch variable speed drive
- Unlimited reversing
- Control center operation
- Self-centering hardened & ground bed



### **THE WADE TOOL CO.**

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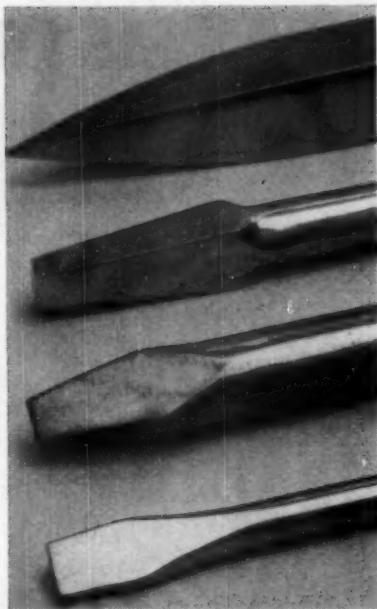
*Makers of Precision Machine Tools for American Industry*

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**SWAGE PARTS**  
**LIKE THESE** 

**SIMPLY  
QUICKLY  
AT LOW COST**

Requires no  
additional machining



**NEW DEVELOPMENT  
IN SWAGING\***

provides lowest cost method for  
producing rectangular, tapered,  
and formed cross sections from  
entry rounds, squares, or rec-  
tangles.

●  
**A REAL BOON TO  
COST CONSCIOUS  
MANUFACTURERS**

*\*Patents Pending*

*Another Great First by*

*Actual unretouched photo of  
swaged samples include from top  
to bottom: Harrow spike, auger  
bit shank, soldering iron tip, and  
screwdriver.*



Fenn engineers welcome the op-  
portunity to evaluate and make  
recommendations for application  
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# New **ARMSTRONG** Swivel Pad can't come off



Now ARMSTRONG deep throat "C" Clamps have the new (Pat. apd. for) ARMSTRONG Ball-joint Swivel Pad. This "C" Clamp pad, developed by ARMSTRONG Engineers, is tougher than any on the market. Rigorous testing in our own plant first proved this fact, and field tests in factories throughout the country have confirmed our own test results.

**Here's Why it's STRONGER.**



The lip of the opening in the ARMSTRONG Ball-joint Swivel Pad is undercut so that when the ball of the screw is inserted, and the lip is permanently forced down, a solid steel wall is formed, inside the pad cavity, completely encircling the ball.

This wall of steel makes it impossible for the pad to come off the screw during normal use. In fact, our tests have proved that it is virtually impossible to intentionally knock the pad off with a hammer—yet the pad is free to swivel through an arc of approximately 40°.

**Call your ARMSTRONG Distributor**



Your ARMSTRONG Distributor can offer delivery from stock on this "400-Series" deep throat, drop-forged "C" Clamp with the new Ball-joint Swivel Pad. He also carries in stock the other styles of clamps in the ARMSTRONG Line—the broadest line of drop forged "C" Clamps.

**ARMSTRONG BROS. TOOL CO.,** 5208 W. ARMSTRONG AVE.  
CHICAGO 46, ILLINOIS

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## Machine and Tool

# BLUE BOOK

*for the Men of Action in Metalworking*

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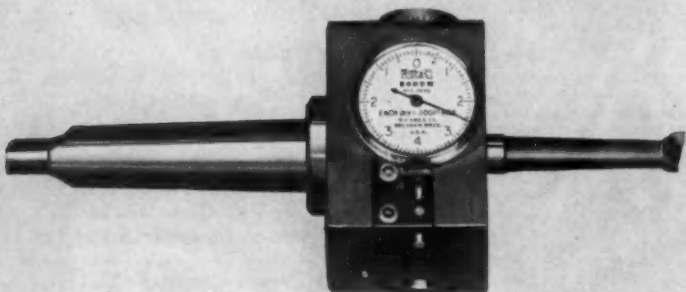
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**Tolerance  
of .000050"**

Put your Bokum tool in the Bokumicro-Dial Boring Head\*. For set-up, bore a hole a few thousandths undersize. Measure the hole and move the dial indicator (which moves the tool) to the exact reading you wish—you can read directly 50 millionths of an inch! You get absolute accuracy on production runs or tool room work. It's Bokumagic! Write today!

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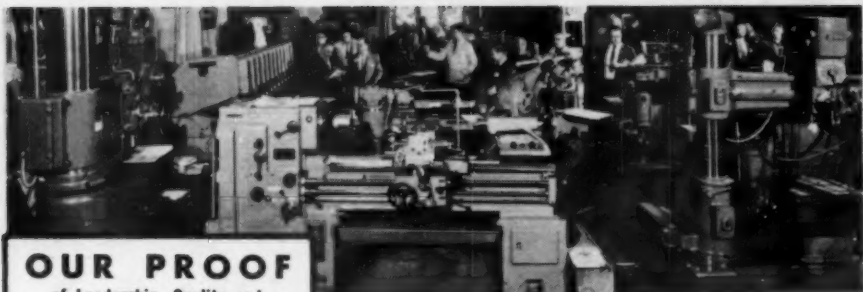
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\*PATENT PENDING

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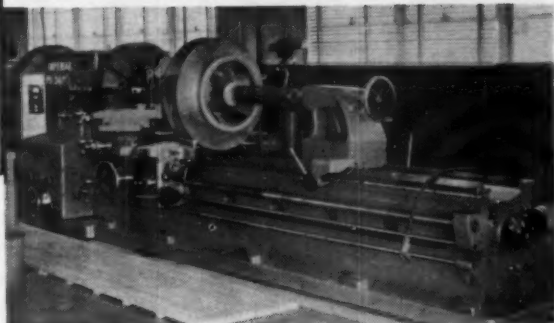
MACHINE and TOOL BLUE BOOK



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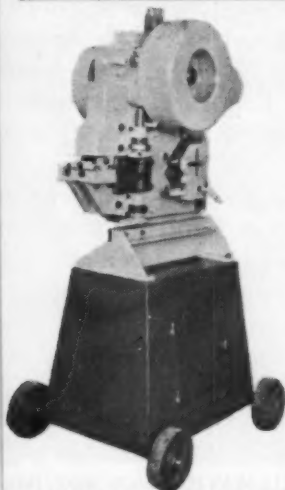
of Leadership, Quality and  
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2. BEST PRICES IN U.S.A.
3. LARGEST MACHINE TOOL STOCK  
—NEW & USED
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5. RENT—BUY—LEASE



### IMPERIAL SLIDING BED GAP LATHE

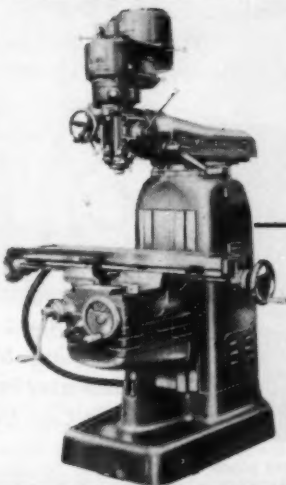
from 30" ctrs. to 300" ctrs.  
MISSILE — T — SLIDING BED  
& SPECIAL LATHES TO ORDER.  
Flame hardened, ground bed ways.  
Heat-hardened gears throughout.  
Precision roller spindle bearings.



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Stationary and portable types  
SHEARS — PUNCH — COPING  
— NOTCH and BAR CUTTER.

**\$2895.**



### IMPERIAL-WESTBURY

Model IS TURRET MILL

**Complete \$2034.50**

Model T-1 TURRET MILL

Compound "Knuckle Joint," 12"  
cross travel, 1½ H.P. 42" x 9"  
table. Power feed to table measur-  
ing and slotting attachments, ac-  
cessories.

**Complete \$2314.50**

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# CINCINNATI

## FILMATIC PLAIN GRINDER

### saves up to 35 hours

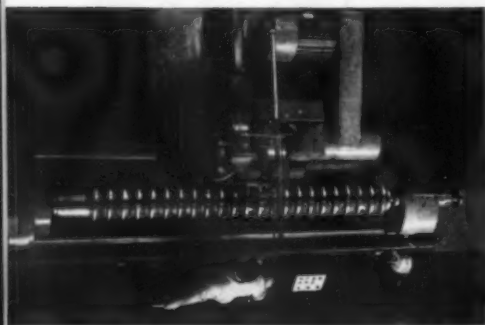
in grinding hard-surfaced mixing screw

AT THE RIGHT you see a rough, tough part. It's rough because it has been hard-surfaced by welding. It's tough because, until recently, it taxed the ingenuity of manufacturing engineers to machine it.

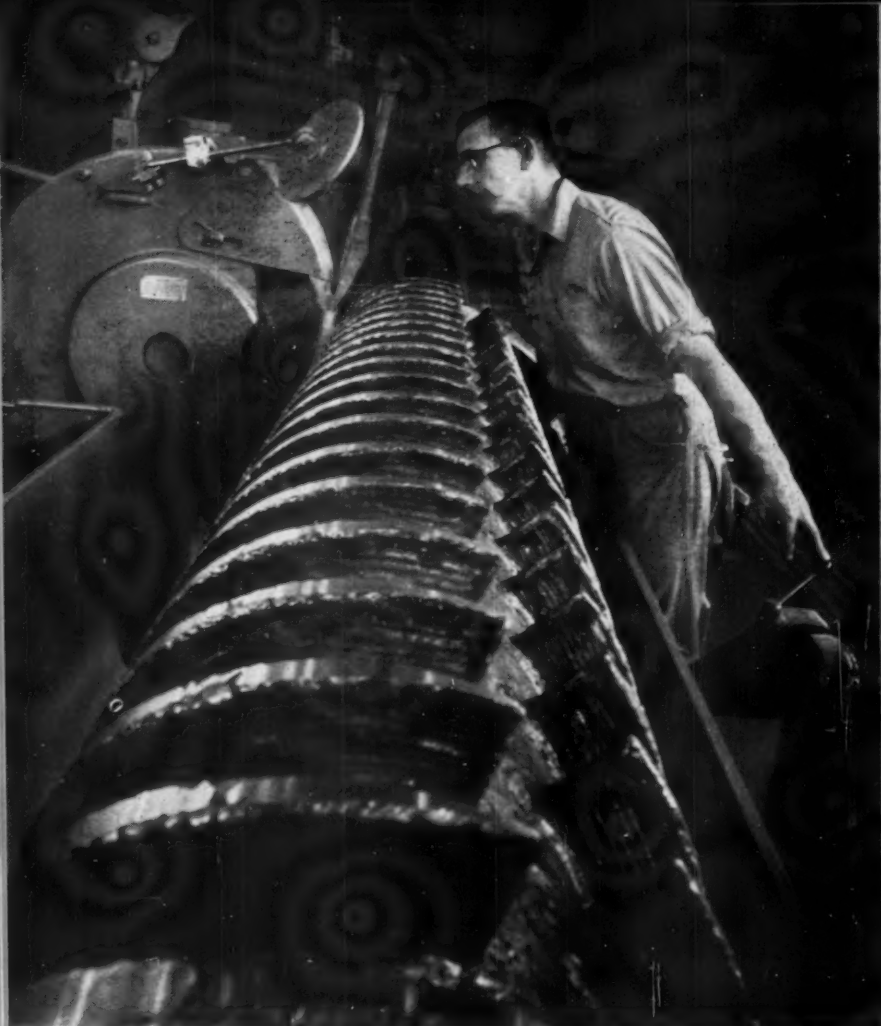
The part is a 16" OD mixing screw, manufactured by a prominent builder of food and chemical machinery. Their problem was to machine the OD of the flights to a smooth finish and at a reasonable cost. Turning operations on a lathe required 35 to 45 hours. Too expensive. Now, the OD is *ground* in 10 to 15 hours! A CINCINNATI FILMATIC 24" x 120" Plain Grinding Machine performs the operation, reducing cost by more than half. And, finish is of much higher quality than ever before.

All CINCINNATI Centertype Grinding Machines are built to operate at the highest standards of performance. Generously proportioned structural

elements are one plus factor. Another is the dependable pressure lubricating system for the ways. And still another is the FILMATIC bearing mounting for the grinding wheel spindle... no adjustment ever required for extreme variables in stock removal. More information on CINCINNATI FILMATIC Plain and Roll Grinding Machines in the heavy duty sizes may be obtained by writing for Catalog G-709-1.



**Tops in grinding heavy, hard stock and large work. It's easy for this new CINCINNATI FILMATIC 24" x 120" Plain Grinder. Catalog G-709-1.**



*Photographs courtesy of Baker Perkins, Inc., Saginaw, Mich.*



Huge savings in time are gained by replacing turning with grinding to remove hard, heavy stock on the OD of mixing screws. A CINCINNATI 24" x 120" Plain Grinder performs the operation, grinding the rough, interrupted surfaces to a high-quality finish.



ROLL • CHUCKING • CENTERLESS LAPPING

# CINCINNATI

GRINDING MACHINE DIVISION

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**Unlocked position •**  
In this position tools are inserted or removed.



**Locked position •**  
Handle is moved upward as shown to lock tools securely. Desired locking pressure obtained by nose adjustment.



**Working position •**  
Tool now securely held in position—handle removed.

## TREE RAPID-LOK COLLET ADAPTER



### EXCLUSIVE TREE FEATURE

The Tree Rapid-Lok is a collet adapter designed to hold end mills, boring bars, and other tooling *accurately, securely* and *with great rapidity* on both horizontal and vertical mills, jig borers, boring bars and other machines.

It is an adaptation of an exclusive feature which has been proved in use on Tree milling machines over a period of years.



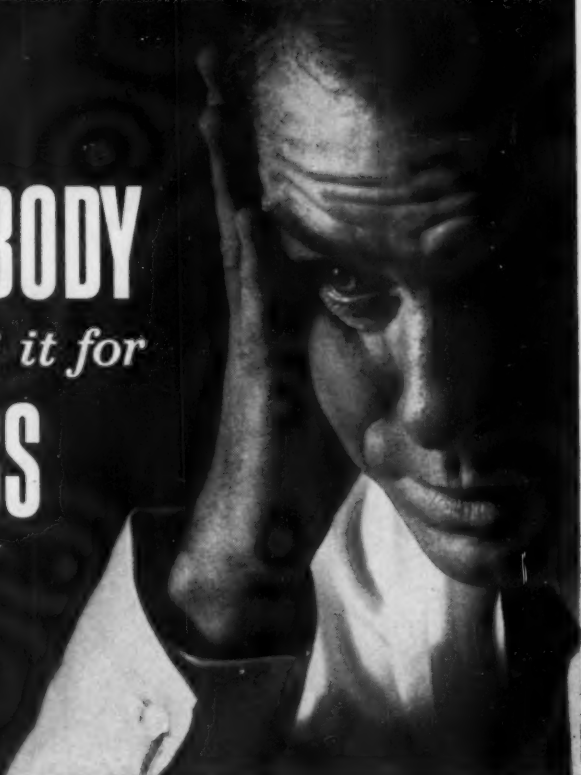
**For Full Information Write**  
**TREE TOOL & DIE WORKS**  
**RACINE, WISCONSIN**

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# SOMEBODY

*is doing it for*

# LESS



## MASTERLINE® 51B SUPERFINISHER

New—for parts not requiring traverse. Longitudinally adjustable platen supports reciprocating unit holding one or two quills. Add a second platen and you can handle up to four diameters at once—automatically.



A similar **Model 52A** offers longitudinal stone traverse. Call your Gisholt Representative or write for Catalog 1159-C.

Are you giving your competitors a decisive edge by using outdated surface-finishing methods?

If you need a controlled finish (1 micro-inch RMS to 80) Superfinish will cut your costs and improve quality.

You save on initial investment, grinding-wheel costs, production time, work-handling, and floor space.

In many cases you can Superfinish® direct from a turned surface and eliminate grinding. On other parts you rough-grind, then Superfinish. Your finish is produced in seconds, automatically, piece after piece!



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Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes  
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**Jacobs**  
MODEL 91

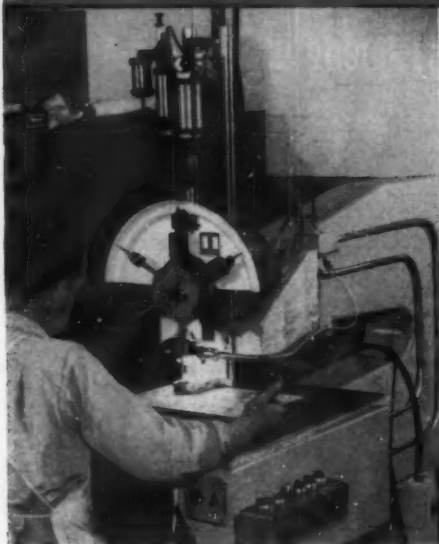
...the world's most accurate collet chuck

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# PRODUCE 5 TIMES MORE PARTS

## BURGMASER Automatic 6-Spindle Turret Drill



• Shot pin fixture locator is shown projecting through table directly under the spindle. Color paths painted on template correspond to colors on spindle tooling as a visual aid for operation sequence.

### Sequence of Operations

Spindle Number	Color Code	Tool	Speed
1	Red	Drill for #4-40 tap	1700
2	Black	Drill for #8-30 tap	1700
3	Green	Drill for #10-32 tap	1700
4	Red	Tap #4-40	900
5	Black	Tap #8-30	900
6	Green	Tap #10-32	900

### Power Feed and Power Indexed Turret Speed Machining

• Meridian Metalcraft, Whittier, California, use a Burgmaster Automatic 6-spindle Turret Drill to machine several designs of Heat Exchangers for Instruments. In the setup shown, 60 holes in a range of three diameters are drilled and tapped in six minutes—five times faster than with former drill press methods. The simpler setup also saves 40% in tooling.

• Special mounting of the Turret Head on a Riveter C-frame provides 45" throat depth for widest utilization of this efficient setup. Bushings in the fixture bottom duplicate the hole pattern, and are sequentially engaged by an air-operated shot pin located in the table directly under the spindle. After hand shifting the fixture to approximate position ( $\pm \frac{1}{16}$ ") as indicated by the template, the operator presses a hand-held control button to seat the shot pin and bring the fixture to exact position. The safely seated shot pin automatically initiates the spindle power feed cycle.



• WRITE FOR FREE LITERATURE on Burgmaster Bench Model Turret Drills and Rapid Positioning Table.  $\frac{1}{4}$ " drill and tap capacity in steel. Representatives in principal cities.



### BURGMASER CORPORATION

SMALL TOOL DIVISION—BURG TOOL MANUFACTURING CO., INC.

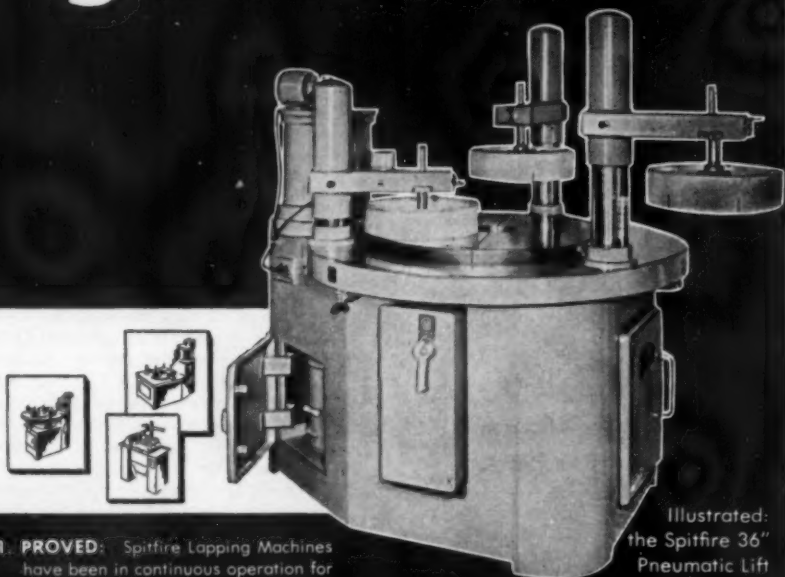
15801 S. Figueroa St., Box 111, Gardena, Calif. • Phone: FAculty 1-3510 • Phone, wire or teletype Dept. OA

World's largest manufacturer of turret-type drilling and tapping machines.

# 123

# SPITFIRE

## basic reasons Lapping is now a standard



Illustrated:  
the Spitfire 36"  
Pneumatic Lift  
Flat Lapping  
Machine


1. **PROVED:** Spitfire Lapping Machines have been in continuous operation for approximately two decades in almost every phase of industry...built-in quality and precision, experienced engineering assure demanded reliability.
2. **NEED:** Quality control requirements for lapping to thousandths of an inch precision has become increasingly necessary. Literally any piece part produced of any material is quickly, accurately, economically lapped and/or finished in small or high volume production with Spitfire machines.
3. **COMPLETE LINE:** from small bench type 6" roller lapping machines to 48" pneumatic flat lapping machines.

Write for free Spitfire Catalog.

# SPITFIRE

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2931 N. Pulaski Rd.  
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**EMPIRE**

**CUT-OFF  
BLADES**  
(LUERS TYPE)

**FASTER, accurate cut-off**  
**LONGER cut-off blade life**  
**SMOOTHER cut-off surfaces**

### **WIDEST RANGE OF BLADE MATERIALS**

1. Empire cut-off blades are available in four grades of H.S. Steel (high-cobalt, high-vanadium). Range covers most any requirement for H.S. Steel tooling.
2. Solid cast-alloy blades (non-ferrous, cobalt-chromium-tungsten) have high red-hardness, superior resistance to abrasion and are non-magnetic.
3. Carbide tipped cut-off blades come in four grades of carbide —the best carbide for each job can be furnished.

### **SUPERIOR DESIGN FEATURES**

1. **Faster Cutting** — precision grinding of all blade surfaces assures sharper cutting edges.
2. **Reduced Friction** — hollow-ground top causes chips to collapse, relieving friction against sidewall of cut.
3. **Cooler Cutting** — collapsed chips permit coolant to reach blade cutting edges.
4. **Greater Precision** — blades are precision ground on all surfaces, centrality of head to shank is held to close tolerances.
5. **Smoother Cut-Off Surfaces** — sharper cutting edges, collapsed chips, better coolant flow, and liberal side clearances add up to smoother cutting.
6. **Longer Blade Life** — wide selection of blade materials, finest blade design, resharpening on front face only, assures longer life on every cut-off job.

*Made under license issued by John Milton Luers  
Patents, Inc.*

**EMPIRE**  
**TOOL COMPANY**

**11501 LAMBS ROAD • MEMPHIS, MICHIGAN**



The job illustrated is typical of work where large amounts of metal are removed. For example, one forging was reduced from 1850 lbs. as forged to 890 lbs. after machining. Material AISI-1045. Floor-to-floor time: 5¼ hours including setup and gaging.

AT CANN & SAUL STEEL COMPANY  
Royersford, Pa.



## 80 lbs. of metal turned from this forging in 3 minutes

**Warner & Swasey 36" swing 5-A in progressive forge shop cuts metal full time at maximum rates yet provides fast handling for small lot production.**

The 5-A turret lathe has the power and the rigidity to hog metal at this clip yet the same machine finishes work to .002" or less for Cann &



Rough forgings machined by the Cann & Saul Company include medium carbon steels, stainless, titanium and other alloys, and frequently are heat treated to 300 Brinell before machining. Eccentric and interrupted cuts are a stiff test of machine rigidity.

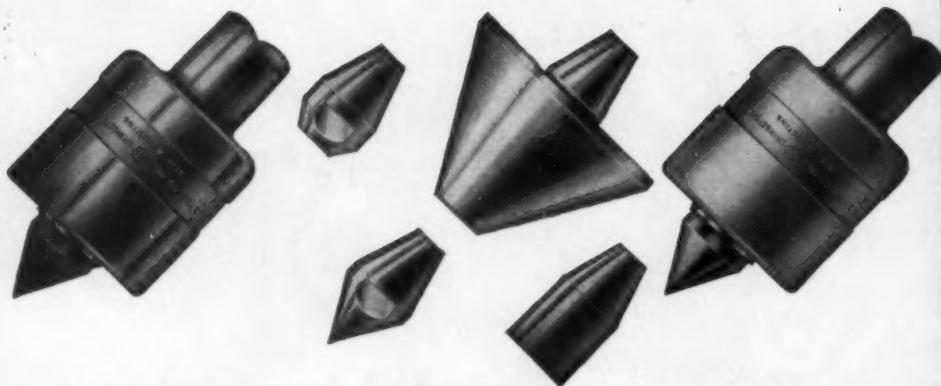
Saul. Heavy metal removal plus the ability to handle one to four-piece lots at low cost on a battery of Warner & Swasey's are but two reasons why Cann & Saul remains a leader in the competitive custom machined forging field. They make good use of the power built into the 5-A Extra Heavy Duty Warner & Swasey turret lathe by taking cuts up to 1" deep at 300 SFPM and .025" feed. The machine's 36" swing and 12½" hole through the spindle accommodates a wide variety of forging shapes.

The hydraulic speed shifts and easy handling tool carriages help the operator to handle small lots efficiently... and the work is within easy reach for rapid gaging, an extremely important factor on a big machine like the 5-A.

For more information contact your resident Warner & Swasey Field Engineer, or Warner & Swasey Company, Cleveland 3, Ohio.

**YOU CAN TURN IT BETTER, FASTER,  
FOR LESS...WITH A WARNER & SWASEY**





Famous Perfection  
Grinding Live Center

H.S.S. and Carbide  
Accurate Detachable Points

Expansion Compensating  
Lathe Centers

## ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION-BUILT LIVE CENTERS

### INCLUDING 5 TYPES OF EXPANSION COMPENSATING CENTERS

- the only complete line
- the only guaranteed self-adjusting live center

INTRODUCING J & S Tool Company's complete new line of live centers with accuracy better than .0001", with these features:

- Guaranteed one year.
- Self-adjusting bearing take-up.
- RPM speeds up to capacity of present-day machines.
- Correct capacity rating.
- Hardened and ground throughout.

*Write today for a free copy of the J & S Live Center Catalog.*

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882 DORSA AVE., LIVINGSTON, N. J.

WYman 2-3181

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# LAYOUT FLUID

FOR ANY METAL

Send for

YOUR FREE SAMPLE

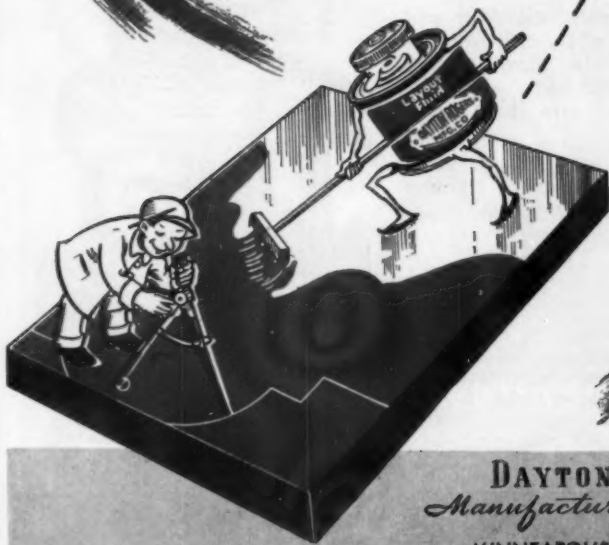
Your local supply house carries Dayton Rogers' Layout Fluid.

Applicable to all metal. One merely wipes the surface clean and then brushes on the Layout Fluid.

Dries Instantly. No waste. Scribed lines are pronounced and contrast to the dark blue background, thus relieving eyestrain.

Assures greater accuracy and speeds up work. You will save time and money on all layout jobs.

A sample is waiting for you. Send for it today.



**DAYTON ROGERS**  
*Manufacturing Company*  
MINNEAPOLIS 7, MINNESOTA

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REDUCE MANUAL HANDLING OF PARTS TO A MINIMUM

**SYNTRON**

**Transfer & Storage**

# PARTS FEEDERS

## Relieve production lag between primary and secondary operations

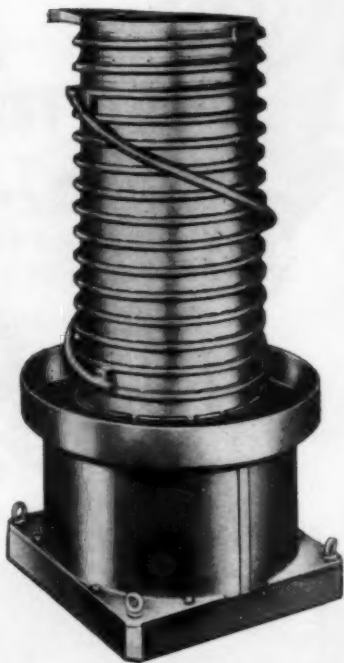
Syntron Transfer & Storage Parts Feeders are designed to receive parts at one level, store prior to usage and discharge in an oriented position at another level. They provide an automatic, instantly adjustable method of distributing parts from one process operation to another; eliminating slow, manual parts handling.

The powerful electromagnetic drive unit produces 3600 instantly controllable vibrations per minute. Simplicity of design means dependability of operation, longer service life, and lower maintenance.

If you have an operation to operation parts handling problem, Syntron Transfer & Storage Parts Feeders will help reduce costs and speed production.



Call your Syntron Representative  
or write for a Syntron Parts  
Feeder Catalog Section.



61PF4

**SYNTRON**

**SYNTRON COMPANY**

300 Lexington Avenue • Homer City, Pa.

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# INSPECTION PROJECTOR MAGNIFIES FOR **(R)** QUALITY...

Our inspection projector magnifies cutting edges to eliminate the minute angular deflection that could cause you costly production losses . . . just one of many inspections that account for Circle R quality.

CIRCLE R saws, slitters and combination center drills must submit to constant exhaustive inspection to work their way to you. They've got to prove they can ensure you correct cutting angles, long service, and minimal downtime.

Consult these CIRCLE R Specialists . . .

**BURBANK**  
Production Mach. Sales Inc.  
**CEBAR RAPIDS**  
McNeal Tool & Supply Corp.  
**CHICAGO**  
Donald Robertson & Co.  
**CLEVELAND**  
Production Tool Co.  
**DAYTON**  
J. R. Smith Company  
**DETROIT**  
J. L. Bradford Associates

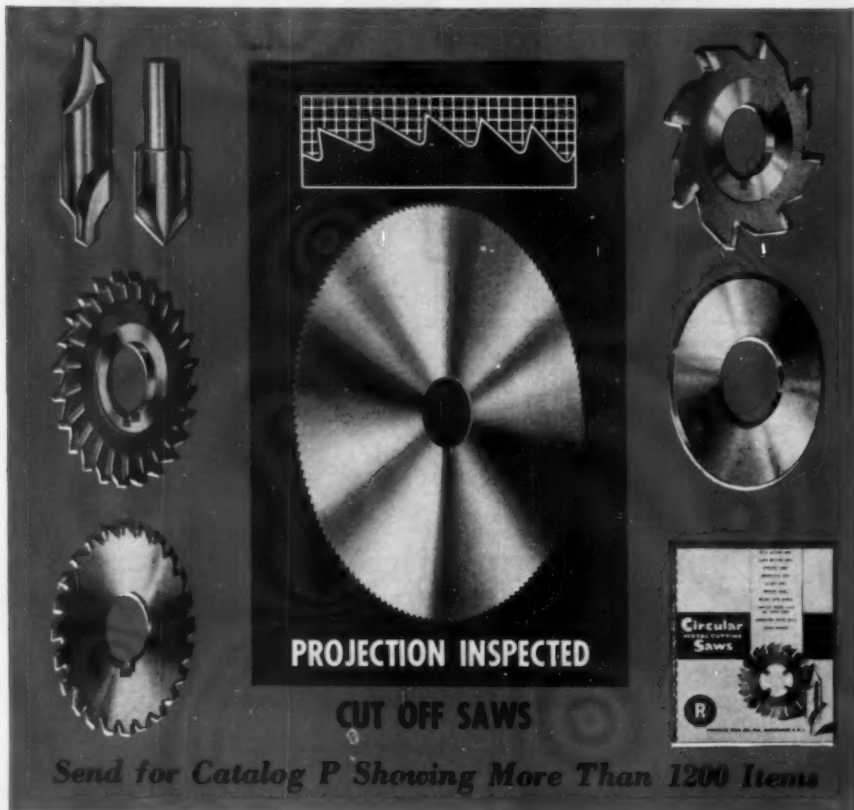
**HACKENSACK**  
The Eaton Company  
**INDIANAPOLIS**  
Samuel Mullins  
**MEMPHIS**  
Branch-Mullins  
Tool Specialists  
**MILWAUKEE**  
Ford Tool Company  
**MONTREAL**  
Humphrey S. Walton  
**NEW HYDE PARK**  
The Eaton Company

**NEW YORK CITY**  
J. V. Connors (Export)  
**PHILADELPHIA**  
General Tool Sales Co.  
**PHOENIX**  
Bilgeman Tool Center  
**PITTSBURGH**  
Ralph Espinosa & Co.  
**PROVIDENCE**  
Fred S. Williams  
**ROCHESTER**  
James C. Watts

## CIRCULAR TOOL CO., INC.

PROVIDENCE 3, RHODE ISLAND  
Specialists in Circular Cutting Tools Since 1923

METAL SLITTING SAWS • COPPER SLITTING SAWS • SCREW SLITTING SAWS • COMBINATION SLITTING SAWS • JEWELERS' SLITTING SAWS • CUT OFF SAWS • CIRCULAR DRIVES & ROTARY SHEAR BLADES • CIRCULOY STEEL SAWS • BALL & TIPPED-TUNGSTEN CARBIDE SAWS • COMBINED DRILLS & COUNTERSINKS • CENTER REAMERS



The advertisement features a central image of a large circular saw blade. Above it is a diagram showing a cross-section of a tooth with a grid overlay, illustrating the inspection process. To the left and right of the central blade are several other types of circular cutting tools, including smaller saws and a gear-like tool. Below the central blade, the text "PROJECTION INSPECTED" and "CUT OFF SAWS" is prominently displayed. At the bottom, a call to action reads "Send for Catalog P Showing More Than 1200 Items". In the bottom right corner, there is a small inset image of a catalog cover titled "Circular Metal Cutting Saws" with a logo featuring the letter 'R' inside a circle.




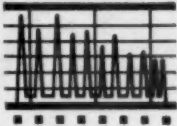
**PROJECTION INSPECTED**

**CUT OFF SAWS**

*Send for Catalog P Showing More Than 1200 Items*

**Circular Metal Cutting Saws**

**(R)**

**IF** you want to control  
and improve the quality of your product  
with measurements displayed  
on a dial  ... in an air column  
or in signal lights   
on a panel  or a chart 

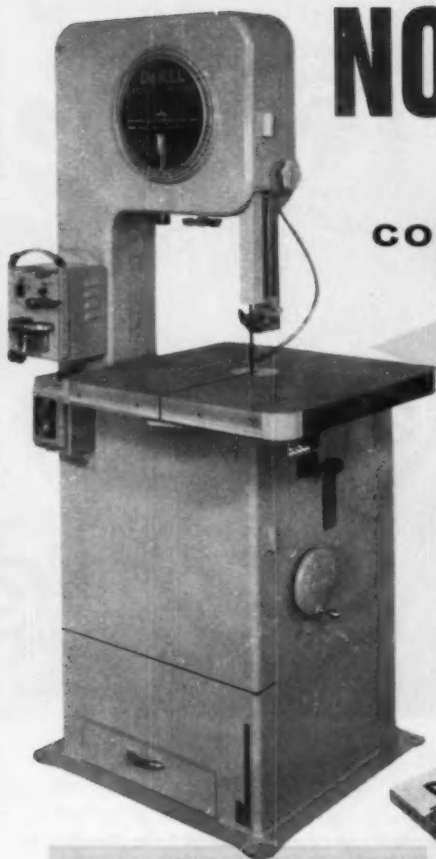
there'll be no **IF** in the results  
when you measure with Sheffield gages

The  
**SHEFFIELD**  
Corporation Dayton 1, Ohio

*A subsidiary of The Bendix Corporation*

Inspection Gages, Dimensional Control Instruments, Machine Controls, Automatic Gaging & Assembly Systems, Measuray® X-Ray Thickness Measuring, Cruzhtrue® & Multiform® Grinders, Cavatron® Ultrasonic Machine Tools, Press-Pacer® Transfer Units, Large Dies, Tooling, Contract Manufacturing.

Use postpaid card. Circle No. 219



#### UTILITY MODEL 1812-U

offers 18" throat and 12" thickness capacity. A larger Model 2012-U has 20" and 12" thickness capacity. Both machines have all-welded box frame construction; No. 10 butt welder; high-speed insert-type guides for band widths from  $\frac{1}{4}$ " to  $\frac{1}{2}$ ", and other top-quality features. Both are guaranteed by DoALL, world's leader in band sawing machines and band tools.

# NOW — OWN A GENUINE

## DoALL

### CONTOUR MACHINE

ONLY

# \$995

**New blades and wider speed range make it more versatile, more productive**

It's a multi-purpose **UTILITY** machine with all the quality and operating features to make it the industry's outstanding buy. A real DoALL in every sense of the word. And a "must" for toolrooms, job shops, sheet metal, maintenance shops, etc.

Designed to take advantage of the increased cutting ability of the new Dart<sup>®</sup> blades, it has a wider speed range extending up to 5200 fpm. New heavy-duty drive assures smooth contour sawing of all machinable materials. And dependable accuracy under the heaviest cuts.

With a full line of accessories and attachments, you can handle a tremendous variety of work in metal sawing, filing and polishing as well as light gage friction cutting. Also for cutting plastics, fibrous materials, etc.

It's the kind of machine that starts earning money for you the day you install it. Call your local DoALL Sales-Service store today for a demonstration.

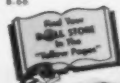


#### USES THIS NEW DART<sup>®</sup> BLADE

The Utility machine is capable of using the new Dart blade, which is guaranteed to outperform any make of carbon steel saw band. Specialized heat-treatment gives it a spring-tempered back and full, hard cutting edge. Custom-welded to length with DoALL's exclusive process—guarantees strongest weld made and perfectly matched teeth. Set is guaranteed to within  $\pm .002$ ".

See it at ASTME Show, Booth 2222 New York Coliseum — May

B-66



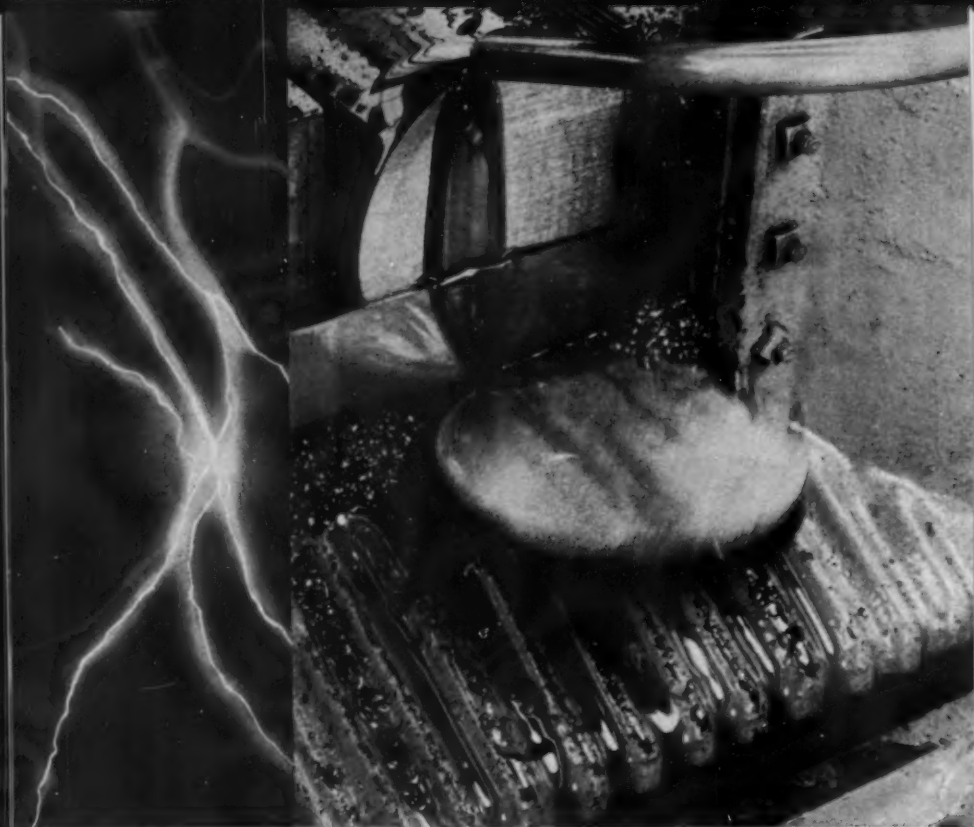
This is a typical DoALL Store

## The DoALL Company, Des Plaines, Illinois

Call Your DoALL Sales-Service Store



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## ***FAST!***

Your hack sawing machines will produce faster cutting-off on all types of work when they are equipped with unbreakable Marvel High-Speed-Edge Hack Saw Blades.

Why? Because these are the blades specifically designed to take the high speeds and heavier feed pressures demanded by today's production schedules.

What's more, your operators know—or will soon learn—they can increase speed and pressure without endangering themselves or the machine, because these are unbreakable Marvel High-Speed-Edge Blades . . . the blades that have set the standard for all other blades to match—if they can.

Ask for Marvel High-Speed-Edge Hack Saw Blades by name and you can be sure you're getting the unbreakable blades designed to give you maximum accuracy and speed in your cutting-off operations. Leading Industrial Distributors have Marvel Blades in stock.

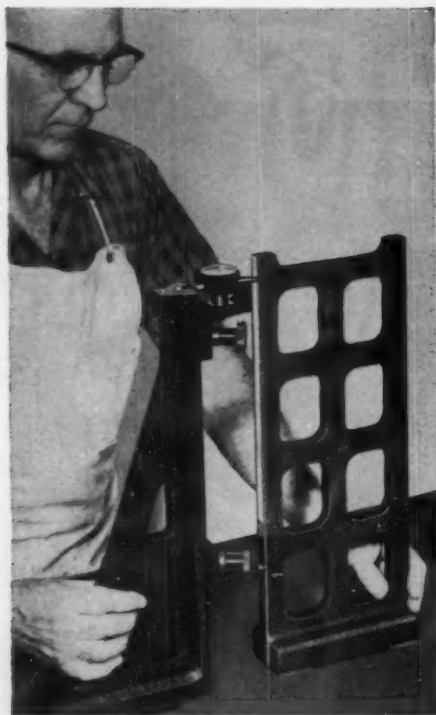
Write for the latest Cutting Tool Bulletin and the name of your nearest Marvel Distributor.

**MARVEL** *Metal Cutting* **SAWS**

**BETTER MACHINES  
BETTER BLADES**

ARMSTRONG-BLUM MANUFACTURING CO. • 5700 Bloomingdale Avenue • Chicago 39, Illinois

Use postpaid card. Circle No. 221



# FAST, True-Square Setups With The Robbins 90° Indicator Gage!

- Checks squareness instantly
- Registers angular errors to plus or minus .0001"
- Dial indicator for easy, visual measurement
- Designed for toolroom, inspection or production use
- Includes Master Square accurate to .0001"

With the Robbins 90° Indicator Gage, inspection and setups are faster, easier, more accurate. No special skills are needed to use it, no shimming or complicated build-ups are needed to check squareness.

A dial indicator visually reads 90° angles with accuracy to plus or minus .0001" on surfaces from 1½" to 17¾" long. The Robbins Indicator Gage also checks relative position of parts or fixture components, and, when used with Robbins

Magna-Sine or non-magnetic Sine Plates, it quickly checks accuracy of angles other than 90 degrees.

The Robbins 90° Indicator Gage is furnished complete with Dial Gage, Master Square accurate to .0001", and fitted hardwood box. Contact your Robbins Representative, or write direct for price and application data on this money-saving shortcut to true-square inspection and machining.

61-28

**EX-CELL-O FOR PRECISION**

PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD VISES AND VISEGRIPS • SMALL DRUMS • JIGS AND FIXTURE COMPONENTS • TORQUE MEASURERS • CONFORM PROJECTORS • GAUGES AND GAGING EQUIPMENT • GRANITE SURFACE MACHINERY • COMPUTER PRODUCTS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • ATOMIC ENERGY EQUIPMENT • DAIRY AND OTHER PACKAGING EQUIPMENT

**EX-CELL-O**  
CORPORATION

Granville Plant, 845 E. Solar St., Granville, Ohio

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**NEW!  
DIFFERENT!**

**MagnaLift** **LIFT  
MAGNET**

with self-contained  
power supply

2000 LB.  
and  
4000 LB.  
CAPACITIES

for scores of  
lifting jobs...  
for conveyors and  
other automatic  
handling equipment



Use it in the plant. Use it outdoors. Use it with remote control. You'll like MagnaLift features such as these: Power pack an entirely separate unit from magnet—power pack can be placed on magnet or placed elsewhere for remote control by extension cable—OFF-ON switch located on top of unit for maximum convenience—built-in charging indicator and plug-in receptacle for battery power pack. You'll like the way MagnaLift makes lifting jobs easier, safer, faster. Send for complete details about MagnaLift, the new and different lift magnet. Write Dept. BB-461.

**Model LM4, \$385.00 F.O.B. Big Rapids, Mich.**

**3 Power Packs**  
(interchangeable)

12-VOLT BATTERY

12-VOLT BATTERY—  
VARIABLE HOLDING  
POWER

110-VOLT A.C.—  
BUILT-IN D.C.  
RECTIFIER

*Hanchett* MAGNA-LOCK CORPORATION BIG RAPIDS, MICHIGAN, U.S.A.

Use postpaid card. Circle No. 223

**ALL SET**  
for more and better  
cuts per dollar!



# Heller

*"Job Tempered"*

## Hack Saw Blades

Heller **nuet**  
UNIFORMED  
**NUWELD**  
12" x 1".050-10T

Heller **nuet** High Speed "A" HAX  
12"-14T All Hard

**UNIFORMITY PAYS OFF:** Uniform set gives the teeth of every Heller blade the clearance needed for straight, fast cutting. Uniform shape, spacing and height of teeth distribute wear evenly and lengthen life. Uniform temper over the full length of every blade adds extra resistance against stresses and strains.

**TEST THEM YOURSELF:** You'll find that Heller's certified uniformity within each blade and from blade to blade adds up to superior cutting at lower costs. Your nearby Heller distributor has a complete line of Heller Hack Saw Blades... 3 types for power use... 3 types for hand use... in all standard specifications. So, he can help you select the right blade for any job.



**HELLER TOOL CO.**

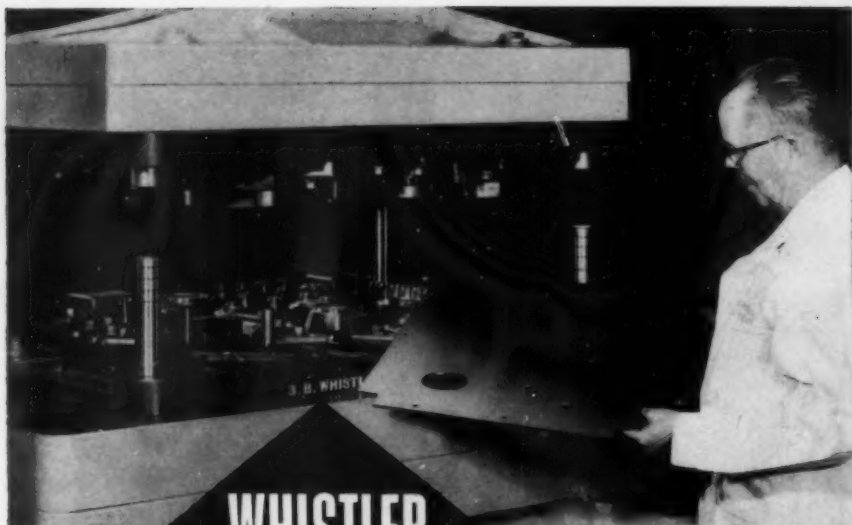
America's Oldest File Manufacturer  
**NEWCOMERTOWN, OHIO**  
Subsidiary of Simonds Saw and Steel Co.

Branch Offices and Warehouses: Newark, N. J. • Detroit • Chicago • Shreveport • Los Angeles • Portland, Oregon

Use postpaid card. Circle No. 224

April, 1961

27



## WHISTLER ADJUSTABLE DIES

For Perforating and  
Notching Materials  
up thru  $\frac{1}{4}$ " Mild Steel

save  
thousands \$\$\$  
in tooling costs

Interchangeable punch and die parts are readily arranged on Tee-Slot die sets. The same parts can be used again and again in different groupings. You profit in numerous ways:

- Even new workers can quickly learn to make pattern changes.
- Tooling costs cut to rock bottom.
- Precise accuracy assured.
- Punches and dies stocked in .001" increments from .100" to .500" diameters. Larger sizes in stock up to 3"

S. B. WHISTLER & SONS, INC.  
746 Military Road, Buffalo 23, N. Y.

### MAIL the following:

☐ Adjustable  
Die Catalog

☐ Magna-Die  
Catalog

☐ Custom Die  
Bulletin

NAME

TITLE

COMPANY

STREET

CITY

ZONE

STATE

GET THE TIME  
AND MONEY  
SAVING STORY  
ON WHISTLER  
PRODUCTS:

magnetic dies  
adjustable dies  
custom dies

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MACHINE and TOOL BLUE BOOK

# POSITIVE DIE PROTECTION AT 350 STROKES/MIN.

## Jobs diverted from \$15,000 press to \$3,000 KENCO ELECTRO-SAFE PRESS

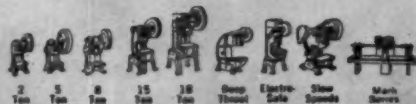
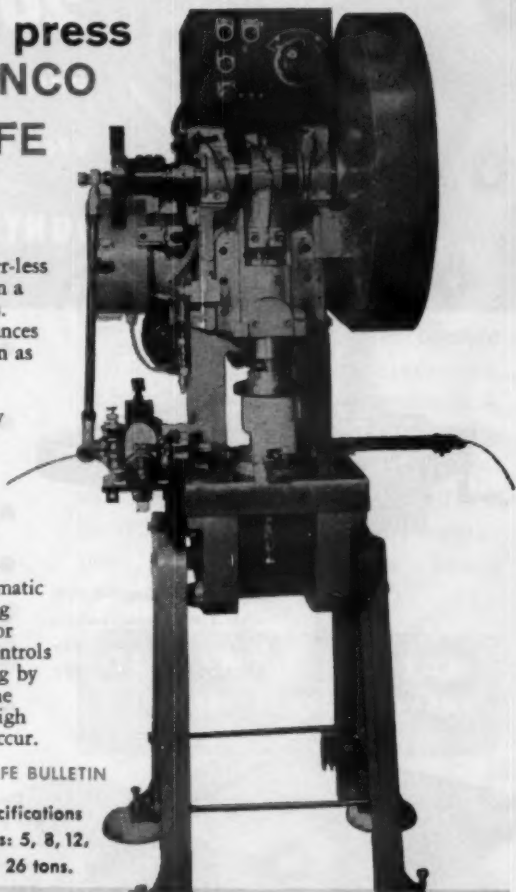
A Los Angeles manufacturer of precision stampings produces burr-less parts at 350 strokes per minute in a Kenco 15-ton Electro-Safe Press. Due to critical die closure tolerances required to blank material as thin as .001", built-in die guidance formerly required heavy die set construction and the die capacity of a \$15,000 straight side press. The \$3,000 Electro-Safe and less expensive sub-press die represent major savings while offering positive die protection.

The advantages of Electro-Safe construction in high speed automatic operation lies in its fast-stopping capability — there is no clutch or high energy flywheel. Unique controls permit most effective monitoring by safety detectors that will stop the press in less than 1/3 stroke at high speed should a "fault" signal occur.

WRITE FOR ELECTRO-SAFE BULLETIN



—complete specifications  
and dimensions: 5, 8, 12,  
15, 18, 23 and 26 tons.



THE MOST COMPLETE LINE OF SMALL PUNCH PRESSES IN THE WORLD



20" variable drive drill  
with 1 HP motor, switch.  
Ready-to-run — only  
\$508.00. Order No. 2271

# NEW CLAUSING 20" HEAVY-DUTY DRILL PRESS

POSITIVE-POWER VARIABLE  
or  
STEP PULLEY 5 or 10 SPEED

## COUNTERSHAFT DRIVES

- **SPEED RANGES —**  
150 to 2000 RPM  
Dial speeds with variable drive model.
- **PRODUCTION RATED CAPACITIES**  
Dia. hole in cast iron..... 1 1/4"  
Dia. hole in steel..... 7/8"
- **GEAR DRIVEN POWER FEED or HAND FEED**
- **MACHINED and BALANCED PULLEYS**
- **19 1/2" x 22" PRECISION GROUND TABLE — 4" COLUMN with 1/2" WALL — MASSIVE, GROUND BASE**
- **READY-TO-RUN — MOTOR and SWITCH INSTALLED — WIRED — FACTORY TESTED**

Clausing drills out-perform — on continuous production, in the tool room, maintenance shop — every application — because they are built better. Ask your dealer to prove it! And write for literature on the new 20" and 15" models.

362

### CLAUSING

DIVISION OF  
ATLAS PRESS COMPANY

OUTSTANDING VALUES IN PRECISION MACHINES



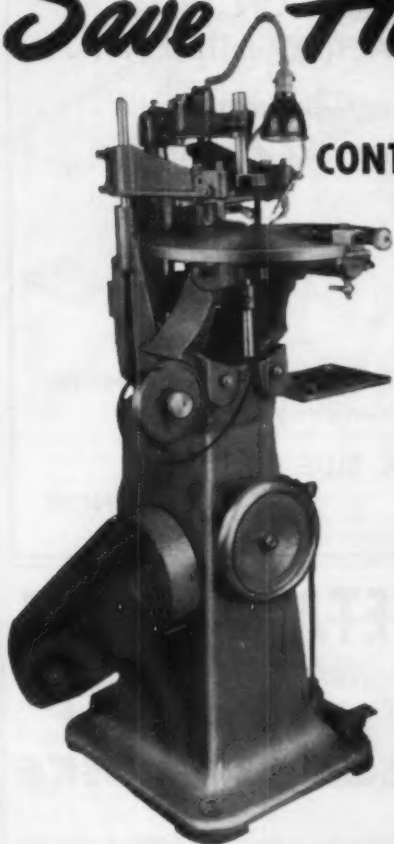
4-109 N. PITCHER STREET, KALAMAZOO, MICHIGAN

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MACHINE and TOOL BLUE BOOK

# Save Hours in tool rooms and die shops with

## CONTOUR SAWING AND FILING



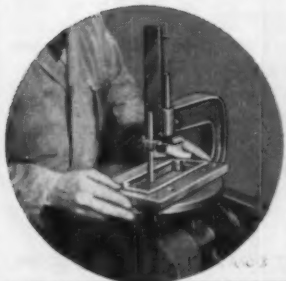
You can save real time and money in the production of parts for jigs and fixtures, dies, gages, templates and special machine production by using an Oliver of Adrian contour sawing and filing machine.

The Oliver is so simple to operate that all sawing, filing and lapping can be handled by an ordinary mechanic—saving a skilled die maker's costly time. Parts can be shaped to dimension faster, more accurately with no hand filing or semi-finishing operations. Available in five types — bench or pedestal. Write today.

**OLIVER of ADRIAN**

OLIVER INSTRUMENT COMPANY

1408 E. Maumee St. • Adrian, Michigan



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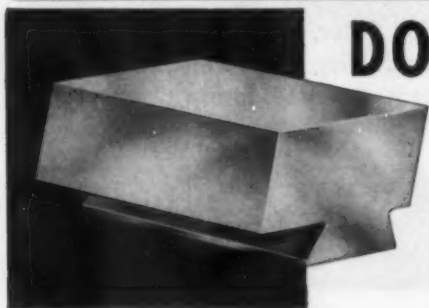
REPRINTS NOW AVAILABLE ON THESE  
BLUE BOOK ARTICLES OF LASTING INTEREST . . .

- ☐ Reducing Production Cost With Pneumatic Devices
- ☐ When—And How Much—Should You Invest In Tooling?
- ☐ Pneumation Of Machines
- ☐ How Douglas Got The DC-8 Airborne
- ☐ The Best Of Dennis Jones
- ☐ Saw Blade Series

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MACHINE and TOOL BLUE BOOK  
WHEATON

ILLINOIS



STANDARD SIZE  
HARDENED DOVETAIL  
FORM TOOL and  
SHAVE TOOL BLANKS

**Somma**

## DOVETAIL TOOLS

**COST LESS  
WHEN MADE FROM  
SOMMA BLANKS**

If you make your own dovetail tools for automatic machines, you can get two fold savings with Somma Blanks.

- Costly machine and toolmakers' time preparing blanks is eliminated.
- Volume purchasing of steel by Somma keeps material costs down.

Prompt delivery in either M-2 or T-5 H.S.S. Write for prices and name of representative in your area.

TOOL CO., INC. 118 SCOTT ROAD, WATERBURY, CONN.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal.

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MACHINE and TOOL BLUE BOOK

# GREEN PANTOGRAPH ENGRAVERS

*You Make Your Own Engraved Nameplates!*

- ELIMINATE DELAYS!
- KEEP YOUR OPERATING COSTS WHERE THEY SHOULD BE!



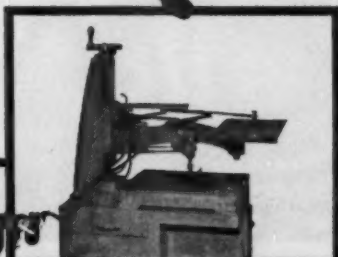
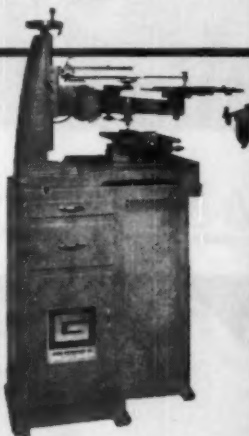
## PORTABLE 40-POUND BENCH MODEL 106

Here is a speedy, economical 2 or 3-dimensional engraver used by thousands of dollar-conscious companies. It features 5 positive, accurate pantographic ratios; ball bearing spindle with 3 speeds up to 14,000 rpm. Is supplied with one copy carrier that accepts all standard master type sizes. Will actually work up to 10" by any width. Height of pantograph and position of cutter are continuously adjustable.

## MODEL D-2 HEAVY-DUTY 2-DIMENSIONAL

Pantograph for milling, drilling and engraving.

Vertical adjustment of copy table automatic with Pantograph. Features: unobstructed on 3 sides to take large work; micrometer adjustment for depth of cut; ball bearing construction throughout; spindle speeds up to 26,000 rpm for engraving or machining; vertical range over 10"; ratios 2-to 1 to infinity — master copy area 26" x 10"



**NEW**

## MODEL D2-201 PNEUMATIC ATTACHMENT

for use with Model D2 Pantograph Engraver to rapidly drill holes in printed circuits by tracing templates. Drills as many as 100 holes per minute. Equipped with foot switch; spindle air cylinder; regulating valve and pressure gauge; filter and oiler. It's ready to use as soon as it's attached to an air compressor.

*Write or call for full details and prices.*

## GREEN INSTRUMENT COMPANY, INC.

Dept. 386, 295 Vassar St., Cambridge 39, Mass. Tel. ELIot 4-2989

# SIMONDS MEANS SAVINGS WHATEVER YOU CUT

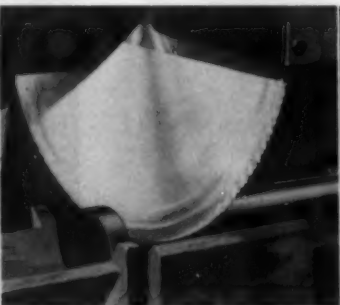


## Now Change from



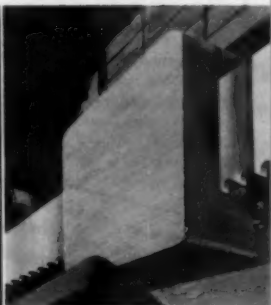
### "Red Tang" Files

For faster, easier filing, Simonds "Red Tang" Files are sharper to start with, hog off more metal per stroke. More wear-resistant, too, they keep on cutting long after other files have turned dull and useless.



### Simonds Circular Saws

Tops for fast, straight cutting, Simonds Saws are designed and made to stay on the job longer. Available in 5 types: Solid Tooth, Hard Rim, Inserted Tooth, Segmental and Carbide Tipped—for lowest cost cutting of all kinds of metal.



### Simonds Band Saw Blade

Our new "Super" High Speed Steel Band saw you up to 3 times better performance other high speed steel blade you're not. It's a startling new advance that can help reduce your cutting costs.



**SIMONDS**  
SAW AND STEEL CO.  
FITCHBURG, MASS.  
HIGH SPEED Molybden  
18" x 1-3/4" .0

# Hacking to Cutting...

## with Simonds "Red End" Hacksaw Blades

**Important Cutting Fact!** Simonds big "Red End" Hacksaw Blades cut curled chips like the cutting tool on a lathe.

Result? You cut faster, you cut straighter — get more work done in far less time.

What's more, Simonds blades are made from tough, cross-rolled steel . . . steel that stays sharp longer, resists breakage, gives you many more cuts per blade!

But don't take our word for it. Test a box of 10 Simonds "Red End" Blades against any 10 others. See for yourself how Simonds will up your cutoff production, lower your blade costs.

Simonds "Red End" Power Blades come in All-Hard

and Shatterproof types in all standard lengths, thicknesses and tooth spacing . . . a "right" blade for every job.

Three types of Hand Blades are also furnished in all standard specifications for easier cutting, longer life and lower costs. Call your local Simonds Distributor for prompt delivery or further details.



Buy through your local Simonds Distributor for

— Local Stocks — Local Speed — Local Skill

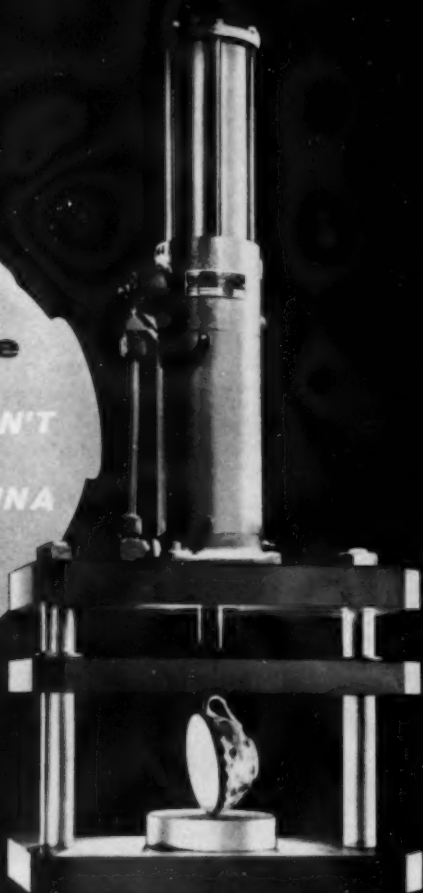
Factory Branches in Union, N. J., Chicago, Shreveport, La., Los Angeles, San Francisco, Portland, Ore. • Canadian Factory in Granby, Que. • Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.; Heller Tool Co., Newcomerstown, Ohio; Simonds Abrasive Co., Philadelphia, Pa. and Arvida, Que., Can.

Use postpaid card. Circle No. 234

**so gentle**

**IT WON'T**

**CHIP CHINA**



So gentle it won't chip china, yet powerful enough to bend steel tubing as if it were a soda straw. In a nutshell, this demonstrates the almost unbelievable degree of control built into Logan air-draulic devices.

The controlled accuracy gives this equipment a versatility and flexibility that makes it adaptable to all kinds of jobs, ranging from precision

laboratory assignments to actual production line work.

If you would like additional information about air-draulic devices or other Logan products, merely fill in the coupon below.

**LOGAN**  
AIR AND HYDRAULIC OPERATED MACHINES

**Check the items you want, fill in your name and address, tear out and mail to:**

**Logansport Machine Co., Inc. • 750 Center Avenue, Logansport, Indiana**

- |  |  |
|--|--|
| <input type="checkbox"/> 100-1 AIR CYLINDERS       | <input type="checkbox"/> 200-1 HYD. POWER UNITS      |
| <input type="checkbox"/> 100-2 MILL-TYPE AIR CYLS. | <input type="checkbox"/> 200-2 ROTOCAST HYD. CYLS.   |
| <input type="checkbox"/> 100-3 AIR-DRAULIC CYLS.   | <input type="checkbox"/> 200-3 750 SERIES HYD. CYLS. |
| <input type="checkbox"/> 100-4 AIR VALVES          | <input type="checkbox"/> 200-4 and 200-7 HYD. VALVES |
| <input type="checkbox"/> 100-5 LOGANSQUARE CYLS.   | <input type="checkbox"/> 200-6 SUPER-MATIC CYLS.     |
| <input type="checkbox"/> 100-6 ULTRAMATION CYLS.   | <input type="checkbox"/> ABC BOOKLET                 |
| <input type="checkbox"/> 100-7 SUB-PLATE AIR VALVE | <input type="checkbox"/> CIRCUIT RIDER               |
| <input type="checkbox"/> 300-1 CHUCKS              | <input type="checkbox"/> CALCULATOR                  |
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Please send copy of catalog

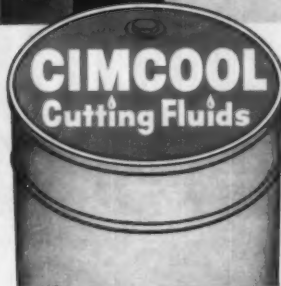
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# PRODUCTION JUMPED 466%

when CIMCOOL S2, the world's leading chemical cutting fluid, got on the job in Chicago.

(Company name on request.)



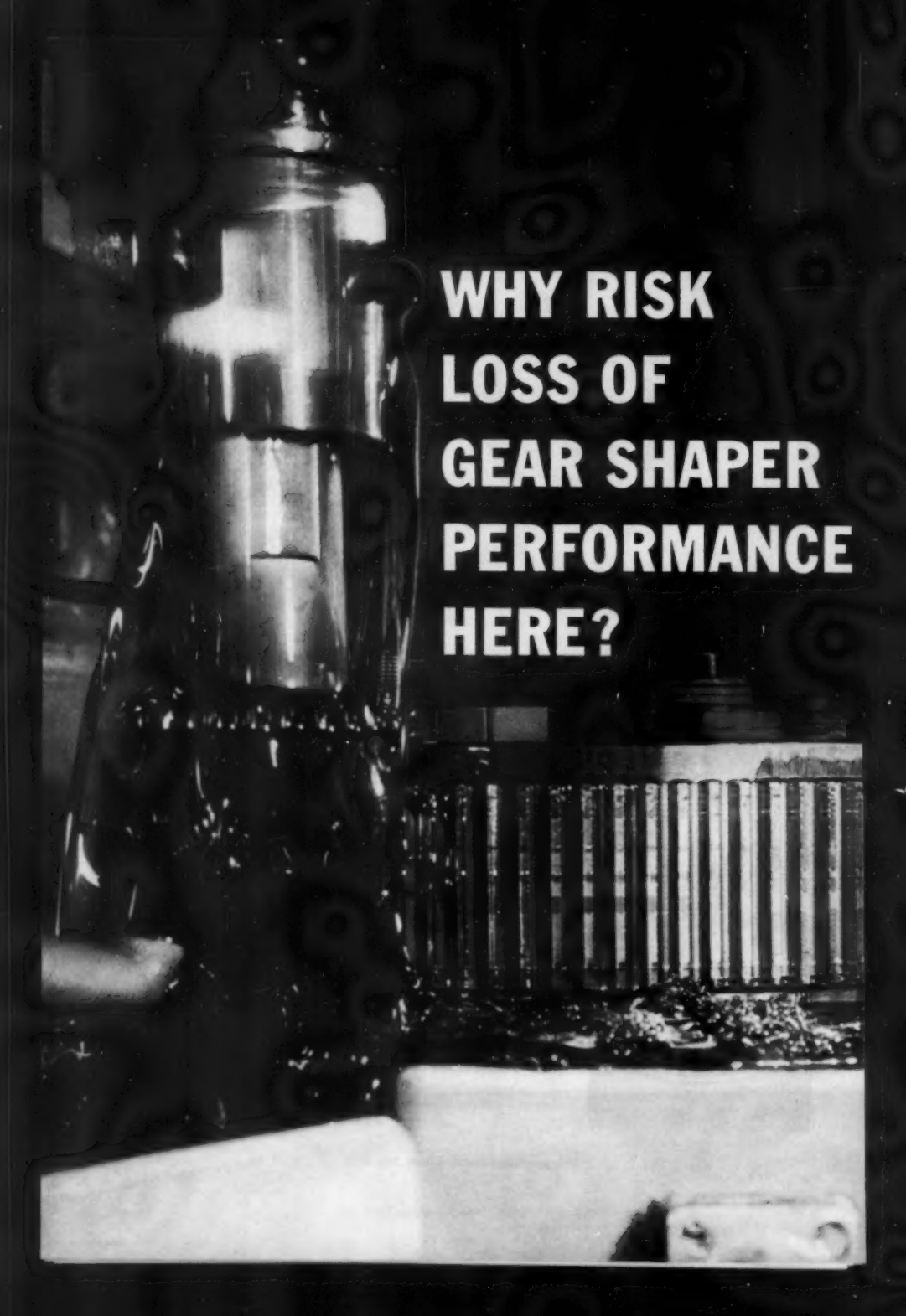
## FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

- CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
- CIMPERIAL® — Newest in the famous, industry-proven line of Cimcool® Cutting Fluids.
- CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
- CIMCUT Concentrates (AA, NE, SS) — For every job requiring an oil-base cutting fluid.
- ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of Cimcool Cutting Fluids, call your Cimcool Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

\*Trade Marks Reg. U. S. Pat. Off.



**WHY RISK  
LOSS OF  
GEAR SHAPER  
PERFORMANCE  
HERE?**

Give your products all the high-production, high precision advantages of Fellows Gear Shaper performance by tooling up with Fellows cutters.

The better design of Fellows cutters is the result of advanced engineering techniques, including the use of a high-speed computer for solving design and application problems. Their better quality is the result of constant advances in metallurgy and manufacturing methods. And, proof of their better performance are the thousands of Fellows cutters in use on modern gear production lines.

Fellows cutters on Fellows machines lower costs and speed production on external and internal, spur and helical involute gears and a wide variety of non-involute shapes as well. All Fellows Offices are at your service for providing information.



THE FELLOWS GEAR SHAPER COMPANY  
78 River Street, Springfield, Vermont, U.S.A.  
Branch Offices:

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150 West Pleasant Ave., Maywood, N. J.  
5835 West North Avenue, Chicago 39  
6214 West Manchester Ave., Los Angeles 45

THE  
PRECISION  
LINE

*Fellows*

Gear Production Equipment

# For fast, easy precision angular set-ups **Magna-Lock SINE CHUCKS and PLATES**

## ELECTRO-MAGNETIC TYPE

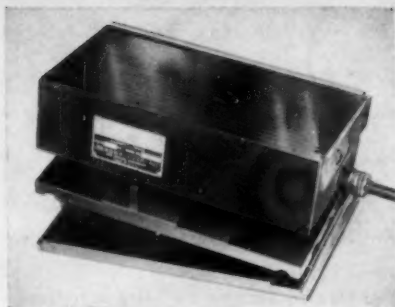
Exclusive laminated top plate. Circular locking take-up on hinge rolls for continuous accuracy. All-steel, moisture-proof. Uniformly distributed holding power.

## PERMANENT MAGNET TYPE

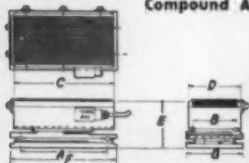
Low height, light weight, positive holding power.

## HARDENED STEEL SINE PLATES

Completely stabilized. Circular locking take-up. Tapped holes for clamping work.

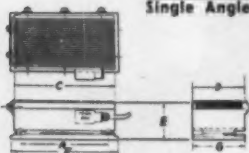


### Compound Angle Sine Chuck



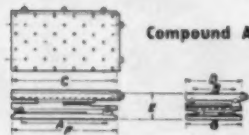
MODEL	(SINE) A	(SINE) B	C	D	E	F	G	PRICE
<b>ELECTRO-MAGNETIC</b>								
DA-5	5,000	5,000	6 1/2	6	5 1/4	7 1/4	6 1/2	\$ 495.00
DA-10	10,000	5,000	11 1/2	6	5 1/4	12 1/4	6 1/2	650.00
DA-1010	10,000	10,000	11 1/2	10	5 1/4	12 1/4	10 1/2	1,300.00
DA-20	20,000	5,000	21 1/2	6	5 1/4	22 1/4	6 1/2	1,750.00
<b>PERMANENT MAGNET</b>								
DP-5	5,000	5,000	6	6	5 1/4	7 1/4	6 1/2	495.00
DP-10	10,000	5,000	12	6	5 1/4	12 1/4	6 1/2	650.00

### Single Angle Sine Chuck



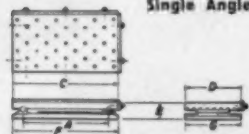
MODEL	(SINE) A	C	D	E	F	G	PRICE
<b>ELECTRO-MAGNETIC</b>							
SA-5	5,000	6 1/2	6	4 1/2	7 1/4	6 1/2	\$ 340.00
SA-10	10,000	11 1/2	6	4 1/2	12 1/4	6 1/2	430.00
SA-1010	10,000	11 1/2	10	4 1/2	12 1/4	10 1/2	850.00
SA-20	20,000	21 1/2	6	4 1/2	22 1/4	6 1/2	1,250.00
<b>PERMANENT MAGNET</b>							
SP-5	5,000	6	6	3 3/4	7 1/4	6 1/2	340.00
SP-10	10,000	12	6	3 3/4	12 1/4	6 1/2	430.00

### Compound Angle Sine Plate



MODEL	(SINE) A	(SINE) B	C	D	E	F	G	PRICE
DA-5P	5,000	5,000	6 1/2	6 1/2	3 3/4	7 1/4	6 1/2	\$ 430.00
DA-10P	10,000	5,000	11 1/2	6 1/2	3 3/4	12 1/4	6 1/2	595.00
DA-1010P	10,000	10,000	11 1/2	11	3 3/4	12 1/4	11	1,050.00
DA-20P	20,000	5,000	21 1/2	6 1/2	3 3/4	22 1/4	10 1/2	1,350.00

### Single Angle Sine Plate

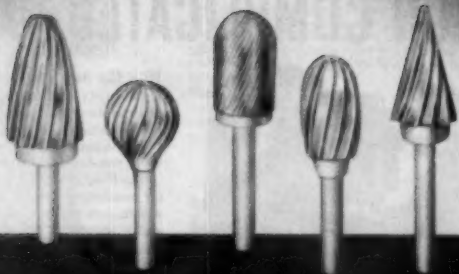


MODEL	(SINE) A	C	D	E	F	G	PRICE
SA-5P	5,000	6 1/2	6 1/2	2 1/4	7 1/4	6 1/2	\$280.00
SA-10P	10,000	11 1/2	6 1/2	2 1/4	7 1/4	6 1/2	380.00
SA-1010P	10,000	11 1/2	11	2 1/4	12 1/4	11	750.00
SA-20P	20,000	21 1/2	6 1/2	2 1/4	22 1/4	6 1/2	920.00

Order now for prompt delivery

# MAGNA-LOCK, INCORPORATED

BIG RAPIDS, MICHIGAN, U.S.A.



## new tools for new horizons...

Today, at the threshold of a new era, when new worlds are opening up at an ever-increasing speed, new tools must be created to meet the requirements of our new technology. Rotary files are increasingly used in thousands of operations for metal removal and finishing, on all kinds of metals. Higher speeds and new materials present special problems and old problems, such as chip removal, assume even greater proportions.

To meet these new requirements, the Grobet File Company of America has developed entirely new types of Rotary files, such as the Faset Tooth® and Bi-Dex® Tungsten Carbide Rotary Files. These major advancements reduce chatter, facilitate the removal of chips and greatly increase speed, ease and efficiency of operation.

*Ask your distributor for detailed information or write directly to*

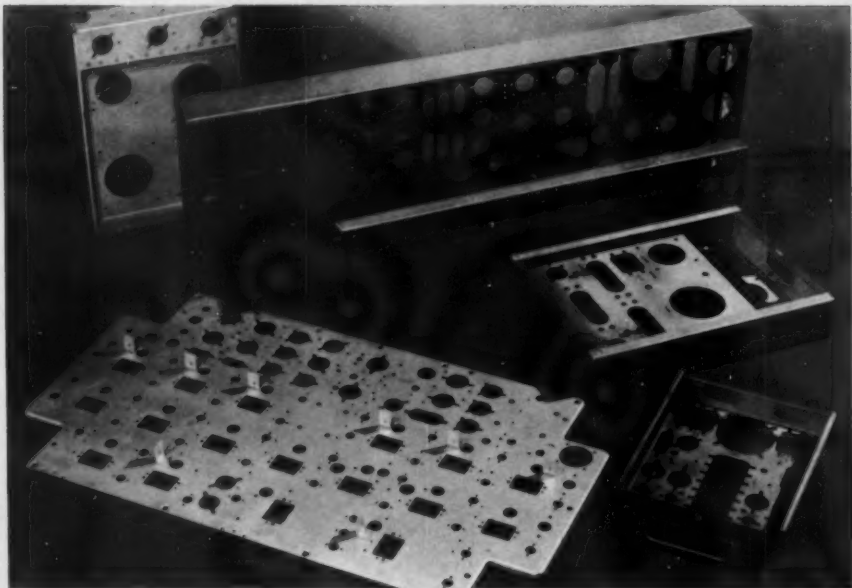


**GROBET FILE COMPANY OF AMERICA, INC.**  
**CARLSTADT, NEW JERSEY**

Offices and Warehouses: Chicago: 311 North Desplaines St.—CEntex 6-1489  
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Los Angeles: 3314 Fruitland Avenue—URidlow 8-1778  
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## PUNCH COMPLICATED PATTERNS FAST



With the new improved STRIPPIT 15-A Fabricator, complicated patterns of round and shaped holes can be produced quickly and accurately in sheet material. A high speed punch press that enables you to produce finished pieces directly from drawings, the versatile STRIPPIT 15-A eliminates slow "in-between" tool designing and die making... saves you days or even weeks of valuable time.

The STRIPPIT 15-A features a unique multiple-stop gauging system for positioning work to exact layout specifications. Punches and dies... within easy reach in built-in file drawers... can be switched from one size to another in less than 30 seconds. Designed especially for prototype and short production runs, the STRIPPIT 15-A is easily converted to a high speed production punching unit with the STRIPPIT Duplicator.

### The STRIPPIT 15-A:

- PUNCHES any round or shaped hole up to  $3\frac{1}{2}$ " diameter. Maximum material thickness is  $\frac{1}{4}$ ".
- NOTCHES 90° corners—rectangular, radii, vee and special shape edge notches—up to  $\frac{1}{4}$ " capacity in mild steel.
- NIBBLES straight line or contour shearing up to 39" diameter circle, at 165 strokes a minute,  $\frac{1}{4}$ " mild steel.

Send now for 15-A catalog. Free demonstration can be arranged right in your plant.

WALES **STRIPPIT** INC.

204 Buell Road • Akron, New York

*In Canada: Strippit Tool & Machine Company, Brampton, Ontario*

*In Continental Europe: Rasquin, S. A., Lausanne, Switzerland*

*In the British Isles: E. H. Jones (Machine Tools) Ltd., Hove, Sussex, England*



For Machines That Move Mountains...



# GEARS

from the

**NEW 12-HD**

**LEES-BRADNER**

You asked for it and Lees-Bradner has built it... after years of design planning and months of building and testing.

This rugged hobbing machine — known as the 12-HD 12" x 20" — will produce gears up to 8, 9, 10, even 12 inches in diameter at mass production speeds. A revolutionary innovation is the new variable speed A.C. drive, using stock — *not special* — stock A.C. motors!

Now truck, tractor and earthmoving equipment manufacturers can generate heavy-duty gears as efficiently as smaller ones have been made.

Write Lees-Bradner for all the details — or get in touch with our representative in your area.

## SPECIFICATIONS

Rated capacity in steel .....	4 D.P.
Max. diameter capacity .....	12"
(with 5" hob)	
Max. helix angle .....	45°
Taper in work spindle nose .....	16 B & S
Floor space .....	60" x 60"

IMPROVING GEARS FOR 50 YEARS

*the*  
**LEES-BRADNER**  
*Company*  
CLEVELAND 11, OHIO, U.S.A.

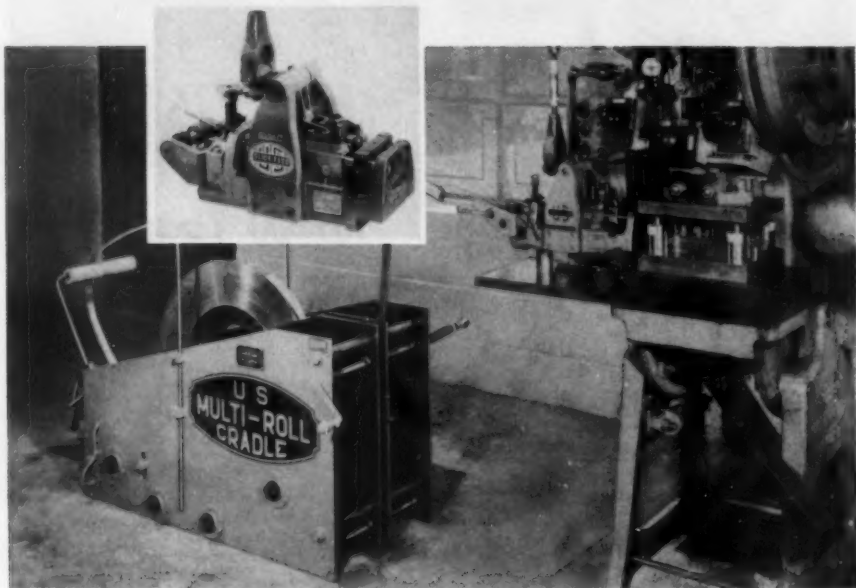
### THE NEW 12" x 20" 12-HD

Designed to produce large, heavy-duty gears at high-production speeds.

Can be equipped with lead differential, electric hob shifter and hydraulic controls.



# U.S. Slide Feed produces at 620 strokes per minute ...tolerances to $\pm .001$ "



U.S. Slide Feed No. 22A, adapted for high speed production and U.S. Multi-Roll® Cradle No. ACC-19C at Triangle Tool Company.

Triangle Tool Company, Union, N. J., using U.S. Slide Feeds, runs continuous production at the rate of 620 strokes per minute. Coil stock, 1010 dead soft, .010" thick x 2" wide is fed into a 9-station all carbide progressive die. Feed length is 1.125". Tolerance is held to  $\pm .001$ " without the aid of pilots. ■ Of all feeds tried by Triangle Tool Company, only the U.S. No. 22A Slide Feed proved capable of maintaining the required tolerance at this high speed. ■ The Feeds used are a variation of standard No. 22A U.S. Slide Feeds modified for high speed operation.

Bulletin #85-60-B describing U. S. Press Room Equipment will be sent upon request.



## U.S. TOOL COMPANY, INC.

AMPERE (East Group) NEW JERSEY

U. S. Multi-Slides® • U. S. Multi-Millars® • U. S. Automatic Press Room Equipment • U. S. Die Sets and Accessories

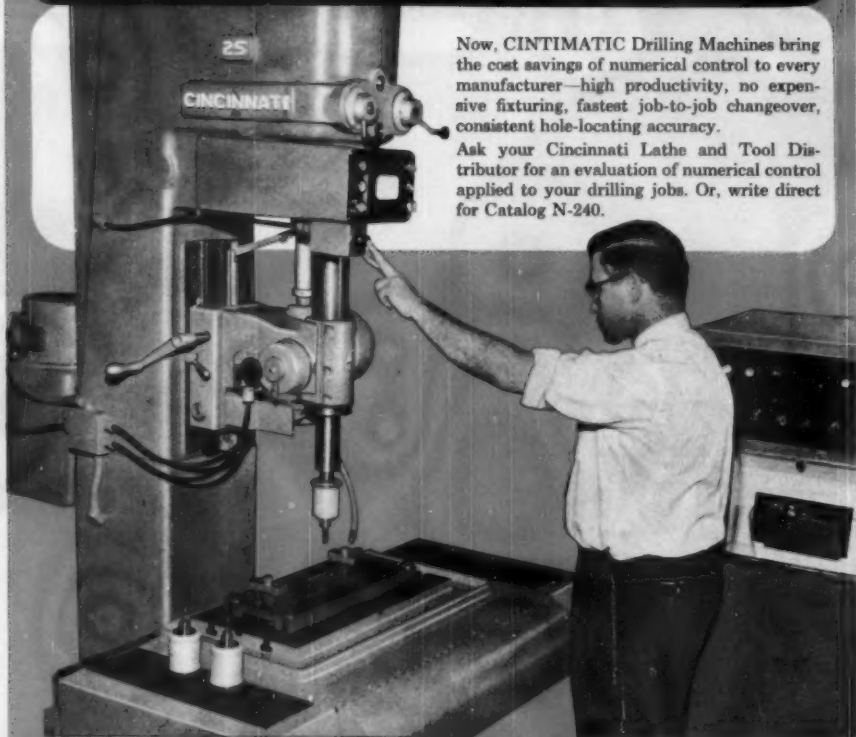
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MACHINE and TOOL BLUE BOOK

# Cut Your Drilling Costs With **CINTIMATIC NUMERICAL CONTROL...** only **\$13,155!\***

Now, CINCINNATI Drilling Machines bring the cost savings of numerical control to every manufacturer—high productivity, no expensive fixturing, fastest job-to-job changeover, consistent hole-locating accuracy.

Ask your Cincinnati Lathe and Tool Distributor for an evaluation of numerical control applied to your drilling jobs. Or, write direct for Catalog N-240.



\* This low, complete price includes 25' numerically controlled drill with complete electrica, power feed, back gear, and Infispeed variable speed drive; 10" x 20" tape controlled, hydraulically operated positioning table; Cincinnati Acramatic control con-

sole with tape reader; complete installation and demonstration service.

This machine is readily adaptable for optional tape control of automatic feed cycle; depth selection from six pre-set stops; tool change indicator.

## **CINCINNATI LATHE AND TOOL CO.**

CINCINNATI 9, OHIO

HYDRASHIFT Lathes / CINCINNATI Drilling Machines / SPIROPOINT Drill Sharpeners

CINTIMATIC Numerically Controlled Lathes and Drills





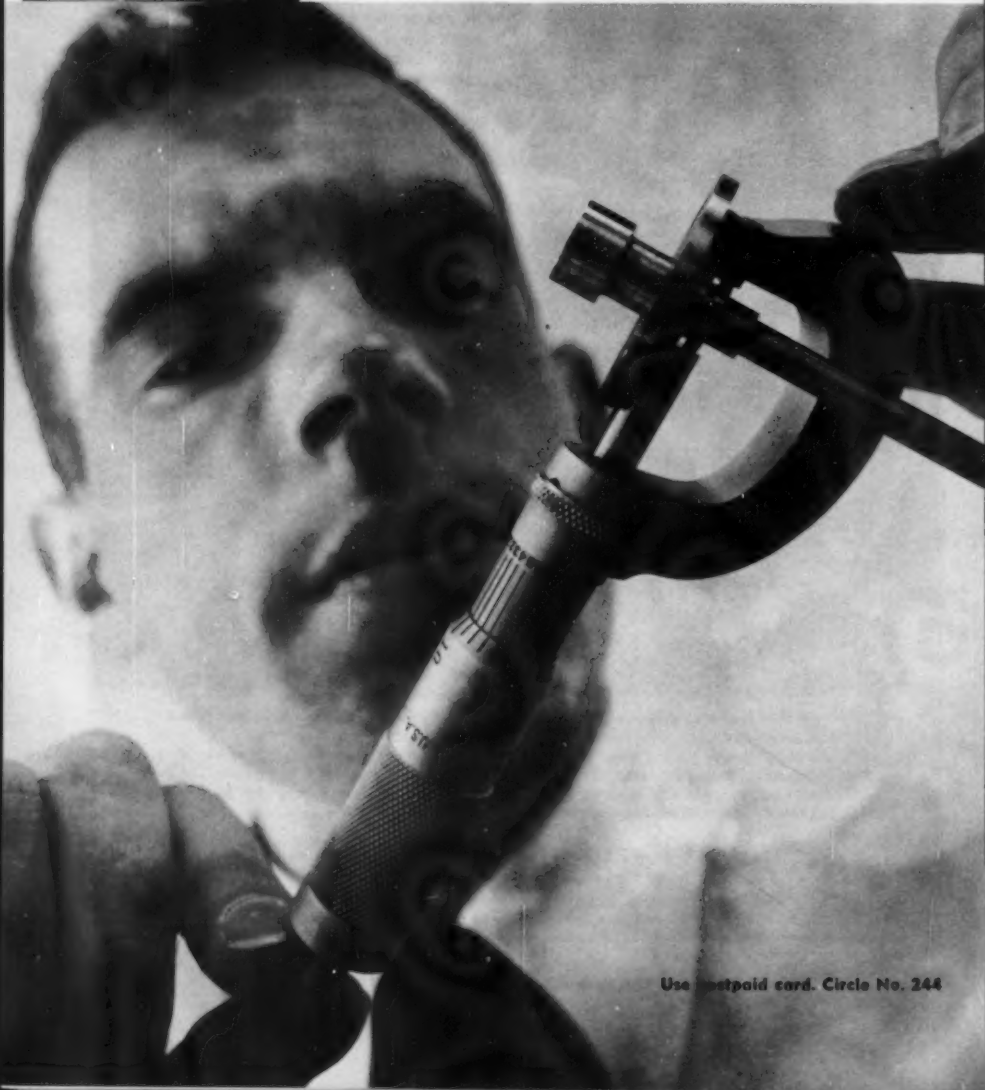
## You can do more with DELTA Metal Lathes

Checking closely on tolerances, time and dollars? These accurate, versatile, low-cost machines can pay their way on your jobs. To see a Delta Metal Lathe in action, write for the name of your nearest Delta Lathe Dealer and get a FREE CATALOG: Rockwell Manufacturing Company, Power Tool Division, 610D N. Lexington Avenue, Pittsburgh 8, Pa.

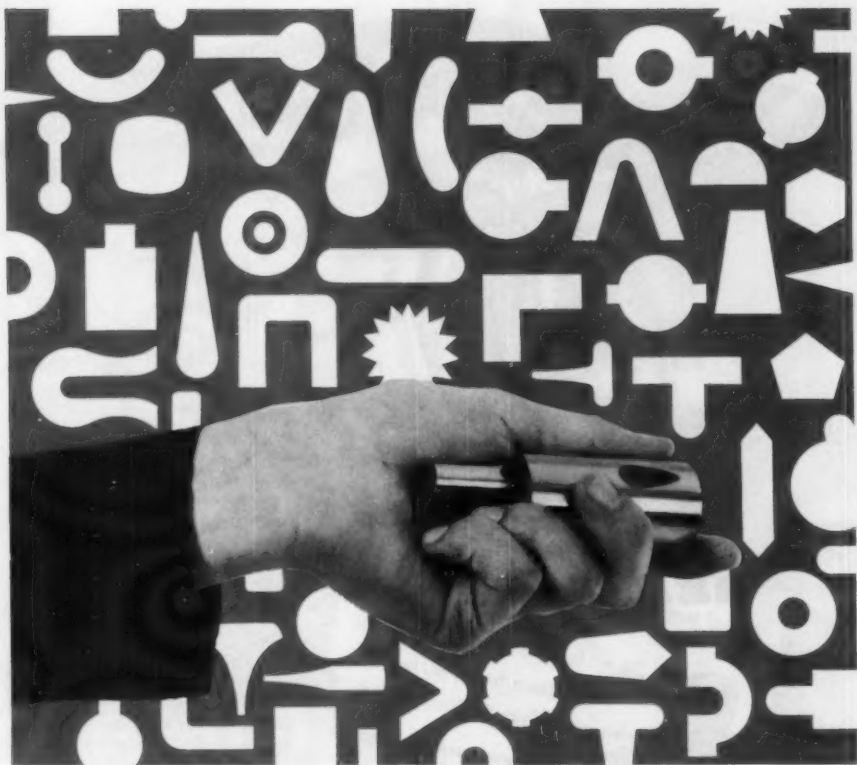
DELTA INDUSTRIAL TOOLS

another fine product by

**ROCKWELL**



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## WHATEVER SHAPE YOU NEED IN A PUNCH OR DIE BUTTON, *Richard Brothers can supply it*

More than 10,000 sizes and types of standard punches and die buttons are immediately available from Richard Brothers' existing stock.

But that's just the beginning. Richard Brothers will also make any special-shaped punch or die button to your exact specifications . . . will fabricate them from special alloys, if you wish. All R-B punches and die buttons . . . standard and special . . . incorporate standardized R-B features which offer complete interchangeability.

Do business with the leader. Specify R-B punches and related metal-piercing tools. It pays . . . many ways.



QUALITY



RELIABILITY



INTERCHANGEABILITY



COMPLETE STOCK

## RICHARD BROTHERS PUNCH DIVISION

ALLIED PRODUCTS CORPORATION

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## REMEMBER?



The blacksmith is one of the oldest metal fabricators. He served a long apprenticeship to learn how to accurately produce metal parts of almost any shape manually, employing little or no power equipment. Remember?

Metal fabricators frequently think along these lines and depend on skill and dexterity to produce accurate parts.

The "Wiedemann Method" employs mechanical work positioning equipment so simply that inexperienced men may become skilled operators in a very short period of time, often in a few days. Efficient, self trained Wiedemann operators and turret punch presses have replaced this slow costly hand work of metal fabricators.

Let Wiedemann Machine Company solve your hole positioning and punching problems. Learn how, merely by installing the "Wiedemann Method" you can realize 60% to 90% savings in your piercing operation. Drop us a line.



*From the versatile 130 ton R-15 down to the hand operated R-2, there's a Wiedemann for your short run piercing requirements.*

# WIEDEMANN

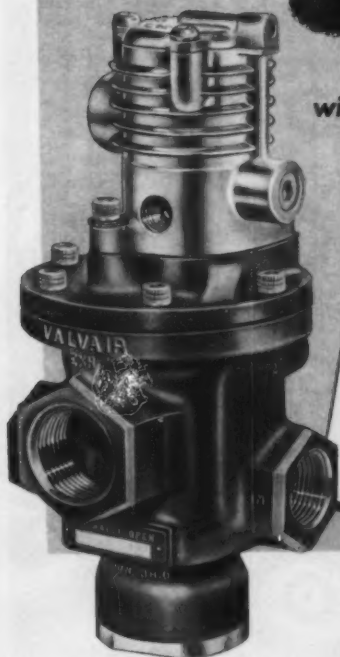
**WIEDEMANN MACHINE COMPANY**  
Dept. M74 Gulph Road • King of Prussia, Pa.

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MACHINE and TOOL BLUE BOOK

split-second response...

more work per hour...



HI-SPEED INLINE with integral pilot, 2 or 3-way, NO or NC,  $\frac{1}{8}$  to  $1\frac{1}{2}$  in. NPT.

with

# Valvair®

Hi-Speed Inline  
**VALVES**

- solenoid coil guaranteed against burn-out for life of valve
- instant-action control
- air-cushioned poppet
- multi-million cycle dependability
- JIC pilot

Short poppet travel in Valvair's HI-SPEED INLINE provides maximum flow almost instantaneously. This shortens machine cycle time . . . lessens brake and clutch slip . . . provides more accurate cuts on high speed cut-offs . . . decreases set-up time . . . minimizes drift, for safer operation.

For increased production . . . lower costs . . . greater safety . . . specify Valvair HI-SPEED INLINE valves.

Write for free Bulletin HIN. Address: Bellows-Valvair, Akron 9, Ohio, Dept. MTB-461



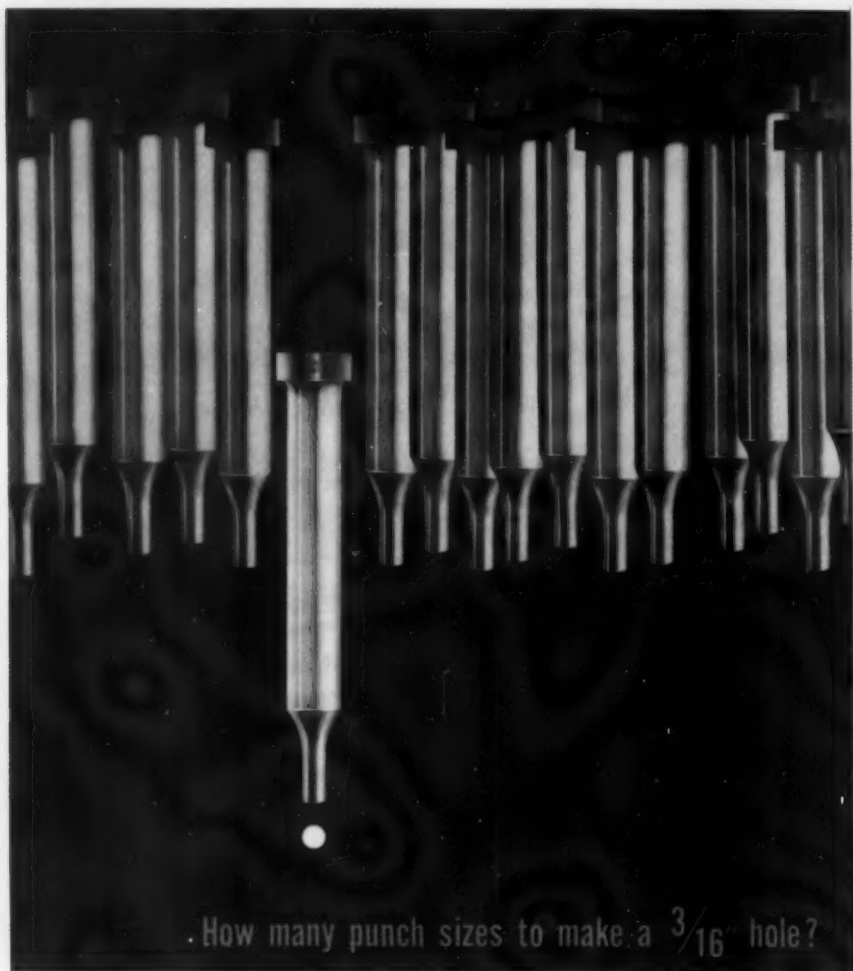
**Bellows-Valvair**  
AKRON 9, OHIO  
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

9100

April, 1961

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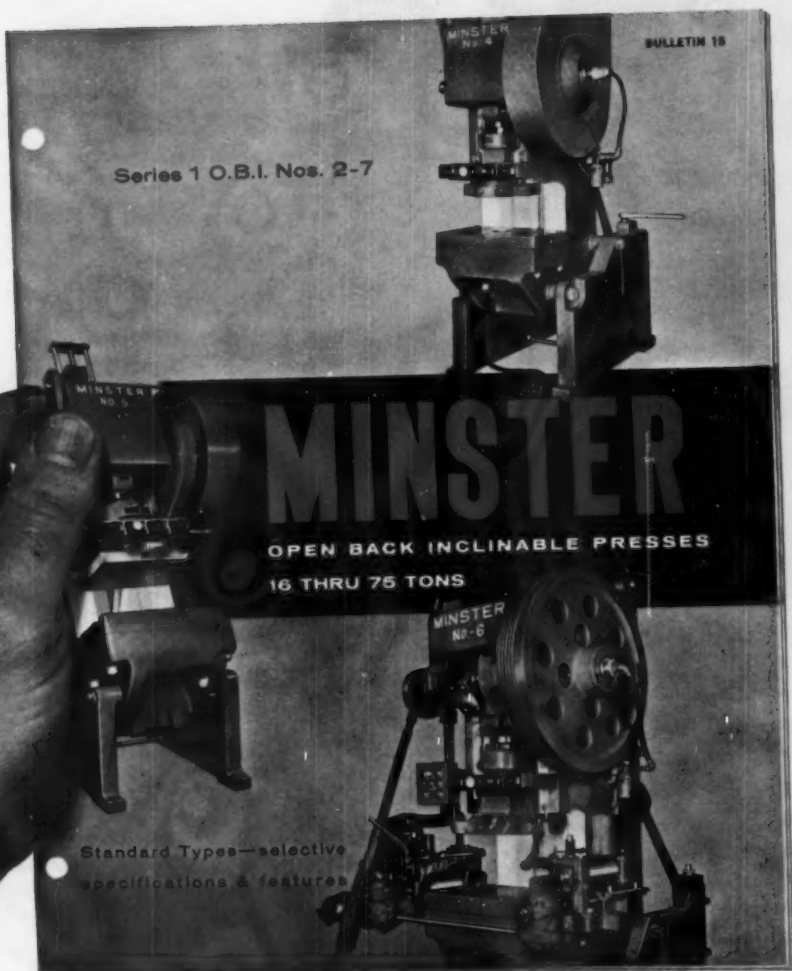


How many punch sizes to make a  $\frac{3}{16}$ " hole?

**Answer: Just one P.U.P.S.—and that's real economy!**

- Lower initial cost • Shelf stocking, no costly replacement delays • Cut inventory costs and wasted space by as much as 87% • Replaces 22 or more custom punch point sizes • Complete interchangeability, A.S.T.M.E. standard • Provides common set of punch standards to avoid confusion. Your Dayton Perforators Distributor has the inside money-saving P.U.P.S. story. Contact him today, or write to:

**pup8**  
PROVEN USAGE PUNCH SIZES  
**Dayton Perforators, Inc.**  
 1336 Stanley Avenue • Dayton 4, Ohio  
 Phone BAldwin 3-9944 • TWX DY-339 ●



The "Hidden Strengths and Values" of Minster O.B.I. presses... points of superiority that only Minster offers the O.B.I. user... are outlined in this new Bulletin 15. It will help you make comparisons when next you buy an O.B.I. May we send you a copy? Write or call...

**The Minster Machine Company, Minster, Ohio**



for speed and accuracy in production  
it pays to use UNIVERSAL DRILL BUSHINGS

UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 10, MICH.



214

# J & L NEWSLETTER

the man who needs  
a new machine tool is  
already paying for it

Actual memo from Production Control to Plant Manager in a large metalworking plant.

## RE: NUMERICAL POSITIONING DRILLS

This memorandum is issued to call to your attention that not having a 2nd J & L Positioning Drill in Department 24 is costing us money. We are either sending overloads to the other divisions or running them on slower machines.

Last week, due to overloads on the Positioning Drill, it was necessary to run some rush work on another machine tool. Each order cost us extra time allowances. Two of the worst jobs were as follows:

1. Part #12036, Operation #2. - We had to give additional time of 1.80 minutes per piece. This is a 56% increase per piece and cost 5.3 extra hours for the entire lot.
2. Part #12461, Operation #2. - We had to give additional time of 2.00 minutes per piece. This is a 40% increase per piece and cost 2.5 extra hours for the entire lot.

I would also like to remind you that we have quoted on several rush subcontract jobs to be run on this machine. If overloads or a breakdown should occur, we would incur substantial losses from running them on slower machines. For example, on subcontract job #XX-2912, we had 30 pieces to run on the Positioning Drill. The cycle time is 23.00 minutes. Because of the Positioning Drill overloads when we quoted on the job, we also computed the time to run on a radial drill. The cycle time came out the same but we would have to spend \$250 for the jig. As the jig cost was so much for a small lot, we also computed the cost on a Post Drill. Here our cost increased 23% per piece because of the additional cycle time and also because the labor grade was one higher.

There is also the possibility of incurring substantial increase in cost if this one machine is down or becomes overloaded because of having to run production orders on jig borers and boring machines. This is caused by lack of jigs on many new parts. As you know, we do not have to "jig up" like we used to because of having the Positioning Drill. For example:

1. #75513, Main Valve Bodies: Routed to the Positioning Drill and we saved about \$650 in jigs.
2. #60342, Adapter: We saved about \$450 in jigs.
3. #75589, Lead Screw Bracket: Routed to Positioning Drill and we saved about \$330 in jigs.
4. #700,090, Mounting Plate for Control Unit: We saved about \$250 in jigs.

Please let me know if there is anything I can do to expedite getting a second machine fast.

There's nothing we could add to this "voice of experience" — except, maybe, to tell you more about our positioning table. Write for further details.



**JONES & LAMSON MACHINE COMPANY**

520 Clinton Street, Springfield, Vermont, U.S.A.

...DOES TOUGH JOBS Dependably, Profitably

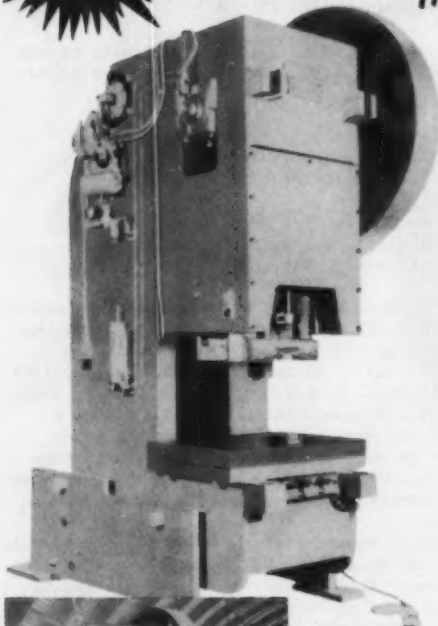
# CLEVELAND



WELDED-FRAME  
COST-CUTTING

Open Back  
Inclinable

## PRESSES



At the Middletown Manufacturing Co. in Middletown, Ky., this new welded-frame Cleveland OBI Press is blanking and piercing  $\frac{1}{8}$ "-thick steel for reclining chair fixture parts and blanks for compressor cases. This Model 13-1 has 150-ton capacity, 6" stroke of slide, 4" slide adjustment, 30 x 45" bed area and operates at 35 strokes per minute.

A 2042A

● Stronger structural frame—streamlined and built to withstand the shock and vibration of heavy-duty stamping.

Dies last longer with less downtime for die maintenance due to Cleveland's large box-type slide that results in greater production accuracy.

75 to 200-ton capacity, built for safer, more efficient operation with all gears and drive mechanism guarded.

Ruggedly built for many different press operations, material can be fed in from either side or from front to back.

Three different positions—vertical, 15° and 30°—to accommodate various types of dies and at the same time make use of gravity feed and discharge in automated production lines, or in operations using a single press.

You get better stampings for less with a CLEVELAND Press—the new welded-frame cost-cutting Cleveland OBI Press.

Write Today for  
Cleveland's OBI Press  
Catalog OBI 3-60



E. 40th and St. Clair Avenue, Cleveland 14, Ohio

# IT'S A FACT!

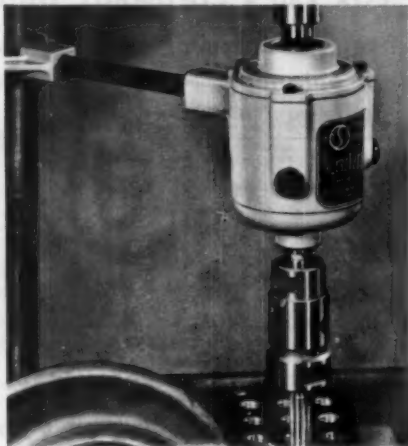
You can tap 1/2" holes  
with a light drill press and Supreme's  
New **VersaTAPPER**



Shaft of Model 6100 is held in drill press chuck. No. 6200 (above) has tapered spindle.



Supreme Acutap Chuck is standard equipment with VersaTAPPER. Capacity 0-1/4"



VersaTAPPER is a compact precision-made tapping unit. Fits any drill press... features half-inch capacity range plus 4-time increase in torque. Easy to install. Simple and quick to remove after use.

**VersaTAPPER...**  
operates easily in any material  
...with widest capacity range  
...yet costs far less

The new VersaTAPPER has scored an instant success with production people everywhere. It has more versatility than other tapping devices. It has the widest capacity range—from 0 to 1/2", but depending on application, use of taps smaller than No. 10 is limited. It develops more power—makes the tapping of 1/2"-13 holes a simpler matter, even with

light duty drill presses. VersaTAPPER is simple to use—can be successfully operated by anyone in your shop.

All of these features at the remarkably low price of \$63.00 complete marks VersaTAPPER as a product you must see at the first opportunity. It's available at your local Supreme Chuck distributor. Call him soon.

**\$63.00**  
**JUST**  
**COMPLETE**

**Supreme**

PRODUCTS CORPORATION

2222 S. CALUMET AVENUE • CHICAGO 16, ILLINOIS



You get more from  
power tools with  
Top Quality  
Supreme Accessories



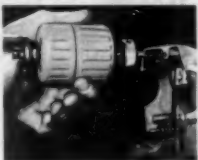
## Supreme Brand Chucks

Noted for unmatched quality. The widest range of sizes and types...one for every machine in your shop. Exclusive Supreme hardening means greater accuracy—longer wear.



## Supreme Versamatic

Reversible speed reducer for portable drills. Fits all makes—permits their use for power screw driving, nut running and heavy duty drilling. 7 to 1 reduction means high torque increase. A fine tool.



## Supreme Push-Pull Tapper

Like the Versamatic, but made for the single purpose of tapping with portable drills. Reverses instantly for tap removal. Handles taps up to 6/16" diameter. Top quality. Simple to operate.

**SUPREME PRODUCTS**  
**ARE IN STOCK IN**  
**YOUR CITY.**  
**CALL YOUR**  
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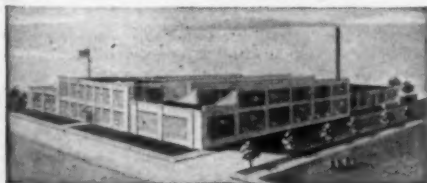
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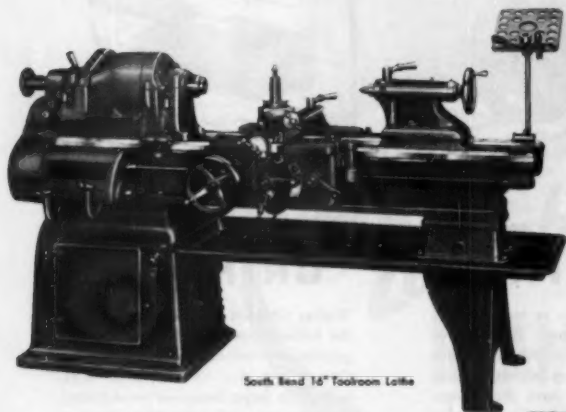
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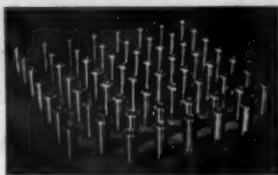
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# SAVE UP TO \$350

on South Bend toolroom lathes with collets



South Bend 16" Toolroom Lathe



Take advantage of this unmatched offer ... purchase any South Bend Precision Toolroom Lathe before May 1st and you will receive a set of South Bend Collets without extra charge. These are precision, milled thread, heat treated collets for round work.

Don't wait ... mail the coupon now!

**YOU SAVE**

LATHE	PRICES START AT	COLLET CAPACITY, MAX.	COLLETS IN SET	SIZE RANGE by 64ths	VALUE of COLLETS
16" Toolroom	\$3230	1 1/8"	61	1/8" to 1"	\$350.75
14 1/2" Toolroom	2760	1 1/8"	61	1/8" to 1"	350.75
13" Toolroom	2358	1 1/8"	61	1/8" to 1"	350.75
10" Toolroom	1783	1 1/8"	61	1/8" to 1"	350.75
10" Toolroom	1590	1 1/8"	41	1/8" to 1 1/2"	196.80
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9" Toolroom	726	1/2"	29	1/8" to 1/2"	130.50

prices f.o.b. South Bend, Ind., less electrolite

**Special Offer Expires April 30, 1961**

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*A Subsidiary of American Steel Foundries*

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**SOUTH BEND LATHE, INC., South Bend 22, Indiana**

Send us complete information on special Toolroom Lathe offer and Time Payment Plan.

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# WALKER CERAMAX



## TURNING

Walker, for the first time in machine tool history, offers safe magnetic holding for lathes. Ceramic magnets in Walker Rotary CERAMAX chucks are not subject to electrical power failure and have three times greater coercive force than ordinary Alnico magnets. With uniform holding power over the entire face of the chuck, safe, accurate turning, facing or trepanning is accomplished in a single set-up.

*For dependable, trouble free operation specify Walker CERAMAX Chucks.*



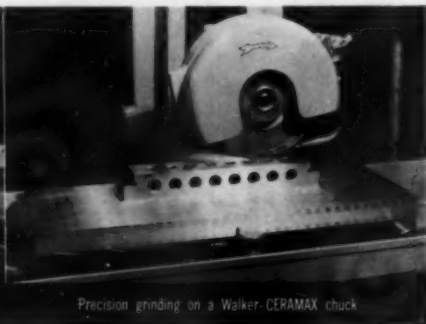
## GRINDING

Walker CERAMAX chucks provide all the holding power needed for standard grinding operations and with fine pole divisions are ideal for thin, small work as well as large, heavy pieces. All-steel top plate minimizes redressing to reduce non-productive machine time. Ceramic magnets retain magnetism permanently, eliminate constant recharging.

**O.S. Walker** Co., Inc.  
ROCKDALE ST. • WORCESTER 6, MASS.  
*Original Designers and Builders of Magnetic Chucks*



Turning a steel sleeve with a Walker Ceramax Chuck

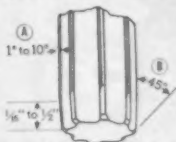


Precision grinding on a Walker CERAMAX chuck

## CLIP AND FILE

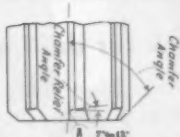
# REAMING TIPS YOU CAN USE

## SECONDARY CHAMFER



Grinding a secondary chamfer angle as illustrated (A) is often recommended. It is useful in applications where a fine finish or close tolerance is required. (B) is the regular chamfer.

## KEEP IT SHARP



A chucking reamer is an end cutting tool. The cutting edges are produced by the chamfers at the ends of the lands. (A) To obtain maximum performance, the chamfers and clearance relief should be reground before excessive wear develops. Each chamfer should be ground exactly even or the tool may cut oversize.

## OVERCOMING CHATTER

To end chatter in reaming, try Chicago-Latrobe's Duo-Spiral Reamer. The alternate left and right hand helixes tend to dampen cutting vibration; eliminate hogging; produce more accurate, better finished holes.

## GOT A PROBLEM?

Arrange a consultation with a Chicago-Latrobe Sales or Service Engineer. His experience in hundreds of plants can lead to a quick solution of your problem.

# Best tip of all...

ASK YOUR  
DISTRIBUTOR  
FOR ...

# Chicago-Latrobe REAMERS

DRILLS • REAMERS • END MILLS

COUNTERSINKS • COUNTERBORES

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Write Chicago-Latrobe or call your distributor

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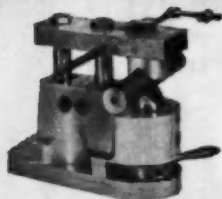
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# NEW NEW



## V BUSHING LINERS\*

**To self center cylindrical, square or hex stock for drilling**

V for victory over a previously ticklish drilling job . . . new hardened ground Acme Industrial V bushing liners clamp over cylindrical (round bars, tubing, etc.), square or hex stocks . . . instantly, automatically locate dead center. Layout, jig boring eliminated . . . just center punch, drill and ream hole! Acting as a liner for removable bushings, Acme's "V" assures precision centered drilling always.

Available in 2 sets of 3 V bushing liners to accommodate slip bushings with O.D.'s of 3/16", 5/16" and 1/2" in a range from No. 80 drill to 11/32" in A.S.A. or Acme standard sizes. Acme V bushing liners . . . a must for every tool box.

\* patent applied for

### ACME INDUSTRIAL COMPANY

202 North Laflin Street/Chicago 7, Illinois

\_\_\_\_\_ Send me complete information on new V bushing liners

\_\_\_\_\_ Send me the complete Acme Industrial bushings catalog

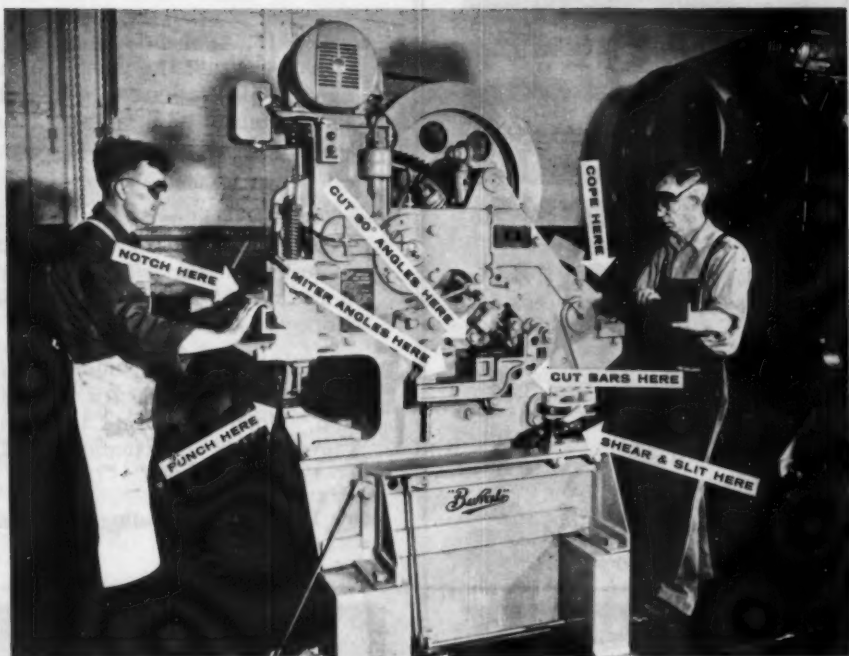
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## SEVEN OPERATIONS—SAME MACHINE

### SAVES ON MAINTENANCE AND PRODUCTION

A BUFFALO Iron Worker can be the most useful, productive and cost-saving machine in your shop.

Without changing tools, it will do a variety of jobs — several at the same time.

It's compact, ruggedly-built, requires practically

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Worth investigating, a BUFFALO U. I. W. pays its own way and returns dividends. Maybe you can't afford to be without one. Write for Bulletin 322 or . . . better still . . . call in your nearest BUFFALO representative.



#### MACHINE TOOL DIVISION BUFFALO FORGE COMPANY

Buffalo, New York  
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'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.



Buffalo's Machine Tools to drill, punch, shear, band, slit, notch and cope for production or plant maintenance.



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Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

**BUILT TO LAST AND LAST AND LAST**



## **WILLIAMS SUPERJUSTABLE WRENCHES**

All Williams Superjustable Wrenches feature an exclusive D-slot design for positive bearing of movable jaw that eliminates spreading action . . . gives longer-lasting service . . . reduces parts replacement. Available in regular or locking styles with chrome or black finish. Chrome style also available with Cementex black insulated handles. All styles drop-forged from selected alloy steel and heat-treated. Your Williams Distributor can give fast service.

**SIX STYLES, THIRTY-THREE SIZES  
LENGTHS FROM 4 TO 24 INCHES**

**J. H. WILLIAMS & CO.**

DIVISION OF UNITED-GRINDING CORPORATION  
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**STRENGTH • DESIGN • ECONOMY**



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Here is the same high quality design and manufacture as the famous Williams' Alloy Wrenches with the following industrial features. New, rust-resistant black oxide finish, chemically applied, lowers cost . . . will not chip or wear off. High lustrous head and face polishing are omitted to lower average cost. These economy features are important where wrench replacement rate is high. Made from strong, tough steel, carefully heat-treated. See your Williams Distributor.

**33 PATTERNS—554 STYLES  
OPENINGS FROM 3/16" TO 7-5/8"**

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## **MEETINGS AN**

**April 11-13, Annual Meeting, American Society of Lubrication Engineers, Bellevue-Stratford Hotel, Philadelphia, Pa., Information: ASLE, 5 N. Wabash Ave., Chicago 2, Illinois.**

**April 18-20 Welding Show, American Welding Society, New York Coliseum, New York, N.Y. Information: AWS, 33 W. 39th St., New York 18, New York.**

**April 24-26 Powder Metallurgy Show, Metal Powder Industries Federation, Hotel Sheraton-Cleveland, Cleveland, O. Information: MPFI, 60 E. 42nd St., N.Y. 17, N.Y.**

**May 1-2 Annual Meeting, American**

**LONG-LASTING • SPRING RESISTANT**



## **WILLIAMS DROP-FORGED "C" CLAMPS**

Made from tough, carefully selected steel, specially heat-treated to increase strength and reduce liability of springing. Screws threaded thru-hardened for extra life. Swivels designed for permanent retention on screws. Heavy Service in 11 sizes up to 12 1/2" cap. General Service in 9 sizes up to 18" cap. Deep Throat in 7 sizes up to 12" cap. Spatter-Resisting in 7 sizes up to 12" cap. Tool-Makers in 4 sizes up to 4 1/2" cap. Also Machinists' Clamps, 4 sizes up to 4 1/2" cap.

**FIVE STYLES IN 38 SIZES  
SEE YOUR WILLIAMS DISTRIBUTOR**

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**MACHINE and TOOL BLUE BOOK**

## CONVENTIONS

**Zinc Institute**, Drake Hotel, Chicago, Ill. Information: AZI, Inc., 60 E. 42nd St., N.Y. 17, N.Y.

**May 8-12 Castings Show**, American Foundrymen's Society, Brooks Hall, San Francisco, Calif. Information: AFS, Golf & Wolf Rds., Des Plaines, Illinois.

**May 22-25 Design Engineering Show**, Cobo Hall, Detroit, Mich. Information: Clapp & Poliak, Inc., 341 Madison Ave., N.Y. 17, N.Y.

**May 22-26 Tool Exposition**, American Society of Tool & Manufacturing Engineers, New York Coliseum, N.Y., N.Y. Information: ASTM, 10700 Puritan Ave., Detroit 38, Michigan.

### MOST FLEXIBLE WRENCH SYSTEM



#### **WILLIAMS DETACHABLE SUPERSOCKETS®**

Save valuable time with these versatile SUPERSOCKETS®. Regular, deep and universal sockets come in hex, 12 pt., square and 8 pt. styles from  $\frac{3}{8}$ " to 3- $\frac{1}{2}$ ". Metric openings from 10 to 36 mm. Five square drive sizes:  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ " and 1" . . . plus ratchets, extensions, and special attachments to form hundreds of wrench combinations.

Made from selected alloy steel, heat-treated and chrome-plated. Order from your Williams Industrial Distributor.

**88 DRIVERS & ATTACHMENTS  
235 SOCKETS—5 DRIVE SIZES**

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A DIVISION OF UNITED GREENFIELD CORPORATION  
410 VULCAN ST., BUFFALO 7, N.Y.



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April, 1961

### FINEST IN FIT, FEEL AND FINISH



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Specially selected alloy steel withstands heavy industrial use. Thin heads combine maximum strength with greatest clearance. Precision broached openings are designed for full bearing on all series nuts and bolts. Slim handles and smooth contours provide safe, balanced grip. Drop-forged, heat-treated and chrome plated. Available from your Williams Distributor individually, or in sets.

**40 STYLES—OVER 450 SIZES  
OPENINGS FROM 3/16" TO 3-1/8"**

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Recent improvements in design and material make Williams Alloy and Carbon Steel Hooks the strongest, safest to specify. Each is heat-treated for maximum toughness and high impact resistance. All are proof-tested to military standards to 50% beyond safe working loads. Available in eye and shank styles in regular and safety patterns. Safety latches feature non-corrosive snap springs with positive, safety action. Alloy steel capacities up to 70 tons . . . carbon steel capacities up to 60 tons. Order from your Williams Distributor.

**SIXTEEN STOCK SIZES  
CAPACITIES UP TO 70 TONS**

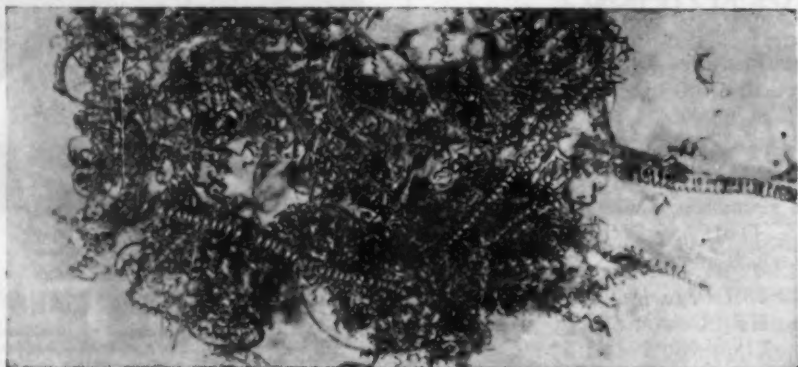
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63



## what kind of chips are these?

This photo shows chips — some as long as 6" — produced by

## FULMER HONING MACHINES

. . . and prove the speed of the process that saves up to 96% in time alone over conventional bore-finishing processes!

In actual production, Fulmer Honing did a job in 40 minutes that formerly required 16 hours by grinding. Fulmer Honing is amazingly accurate as well as fast. It produces round and straight bores with maximum accuracy . . . to plus-or-minus .0001 limits.

LET US ESTIMATE . . . send prints or work-piece sample for free time and honing costs estimate. OR . . .

DO-IT-YOURSELF . . . write on company letterhead for FREE Honing Computer that figures honing time on any diameter bore, length and material, and gives other valuable information on stones, speeds, etc.

Write Today: C. Allen Fulmer Co., Dept. B, 107 E. Fourth St., Cincinnati 2, Ohio.



THE WORLD'S BEST  
**fulmer honing equipment**

# collets, pushers, details

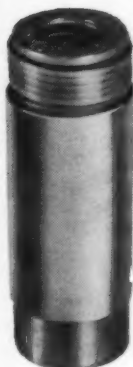
accuracy is our  
Standard



## Allen's Burn Style TAPER LOCK PUSHERS

Automatic Adjustment  
Positive Feed

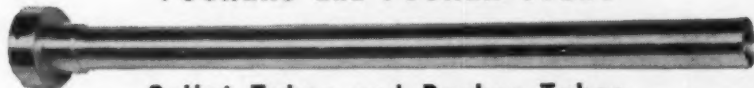
Minimum Scratch  
When Specified



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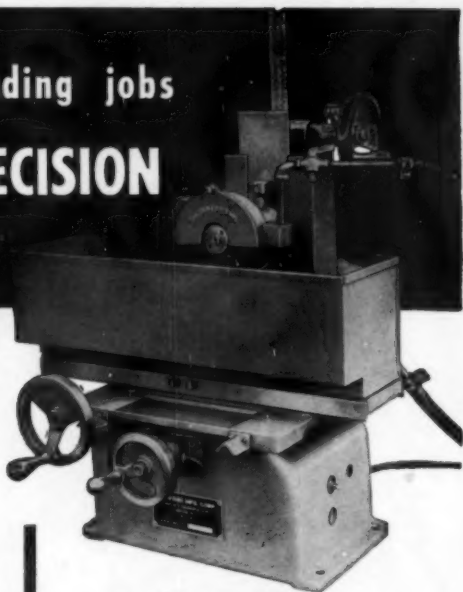
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to **MICRO-PRECISION**  
**FAST...**

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SANFORD  
Model SG  
SURFACE GRINDER**

This unrivalled small parts grinder can be depended upon for micro accuracy. It's easy to use too . . . every hand wheel and operating switch is at your finger tips.

Designed and built by engineers and tool makers of rare foresight for tool, die and gage work, it has been constantly preferred after these many years of proven worth.

Write for fully illustrated literature, replacement parts and special attachments data with price list.



**For WET or DRY  
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optional equipment.**

**PARTIAL SPECIFICATIONS—**

Chuck Surface—3"x5" or 4"x6".

Table travel—8", traverse 4".

Vertical head movement—6".

Work area under 4" wheel—6",  
with chuck—4".

Standard grinding wheel—  
4"x $\frac{3}{8}$ "x $\frac{1}{2}$ ".

Spindle speed—approx. 5500 RPM.

Motor, 1/6 HP, single or 3 ph.,  
dynamically balanced.

Dimensions—23"x30"x27" high.

Net wt. approx. 160 lbs.

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MAJOR AIRCRAFT MANUFACTURER MAKES...

## Fully Automatic Savings with NELCO TOOLS on Tape Controlled Miller!

### OPERATION #1 PROFILE MILLING AROUND WING SECTION

**MATERIAL:** Aluminum Alloy, Tough & Abrasive. **CUTTER USED:** 2" diameter, 2 flute NELCO Carbide Tipped End Mill, Negative Helix. **SPEED:** 3600 R.P.M., 1900 S.F.M. **FEED:** 20" per minute. **WIDTH OF CUT:** 1½". **DEPTH OF CUT:** ⅜ to ¾ inch. **PRODUCTION:** Nelco End Mill conformed to aircraft tolerances and to rugged automated production schedule.

There are 121 Nelco End Mills specially engineered to mill Aluminum.



Machine: Giddings & Lewis, 2 spindle vertical, 100 H.P. each spindle, tape controlled.

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**MATERIAL:** Aluminum Alloy, Tough and Abrasive. **CUTTER USED:** Standard 6" diameter Nelco Face Mill modified with 30° chamfer. **SPEED:** 3600 R.P.M., 5400 S.F.M. **FEED:** 80" per minute. **WIDTH OF CUT:** 6" **DEPTH OF CUT:** ¼ to ⅜ inch. **PRODUCTION:** 2 cubic feet of metal removed in 20 minutes. 6 pieces per grind—12 cubic feet of metal removed per grind.



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*For that **EXTRA** Edge in Production!*

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# NELCO

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Subsidiary of: Cutting Tool Division  
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# Another P.D.Q. *FIRST!*

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### ADJUSTABLE RAKE

*Manchester...*

### Cut-off Tool



- ★ Positive position locking.
- ★ Eliminates special tooling.
- ★ Adjustable 0° rake to positive 16°
- ★ Re-setting without losing center location.
- ★ Eliminates grinding for proper rake angle.
- ★ Available for all makes of Turret Lathes, Engine Lathes, Automatics and Cut-off Machines.

This new "Manchester" tool can save special tooling costs and time costs in special tool grinding. The tool is infinitely adjustable to any setting from 0° rake to positive 16°. Cutting point is always at center height regardless of rake angle to insure correct cutting action. Complete facts are available, write for literature.

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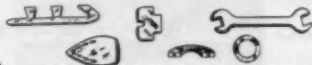
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DEBURR with...

## ONE machine—ONE operator—ONE pass

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Hammond Flat Finishers have the latest features: automatic belt tracking and oscillation, automatic air tensioning for abrasive belts and conveyor belt, variable speed conveyor, ammeter on each head, and other features which contribute to maximum production at lowest possible cost.

Send us one finished and a few rough samples so our engineers can analyze your finishing requirements. No obligation.



**1 TO 6 HEADS  
6" TO 12" WIDE**



Available in 6", 8", and 12" widths

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INC.

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High-speed tables . . . 10 to 70 FPM cross feed .005" to .250" with rapid traverse . . . hardened and ground lead screws . . . chrome plated table ways (at extra cost) . . . direct motor driven spindles.

#### No. 10-H

6" x 18" working surface, 16½" height under a 7" wheel. Jobs set up quickly for tool room or production grinding. 1 HP 3600 RPM spindle drives 7" grinding wheel.

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10" x 16" working surface for die block work requiring wide cross feed, or general tool room and production work. 2 HP 1750 RPM spindle drives 12" grinding wheel for heavy stock removal.



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BENTON HARBOR

now offers  
2 HYDRAULIC  
**SURFACE  
GRINDERS**

6" x 18"  
and  
10" x 16"

\$3285  
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GRINDERS**

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Since 1874

SEND TODAY for details  
on 10-H and 17-H — and  
on Covel's complete line.  
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# Eclipse

## CUTTING TOOLS

are

*"Engineered for You!"*

For almost half a century ECLIPSE has engineered and produced quality cutting tools.

These years of leadership in the field guarantee the superiority and dependability of all ECLIPSE products. For longer tool life, finer finishes and better all-around performance, look to the symbol of perfection.



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WRITE FOR CATALOG C-59



### ECLIPSE COUNTERBORE COMPANY

1600 BONNER AVE., DETROIT 20, MICHIGAN

# **NEW Automatic Loading and Feeding for Grieder Tube Cut-Off Machines ...4500 to 6500 cut-offs per hour!**

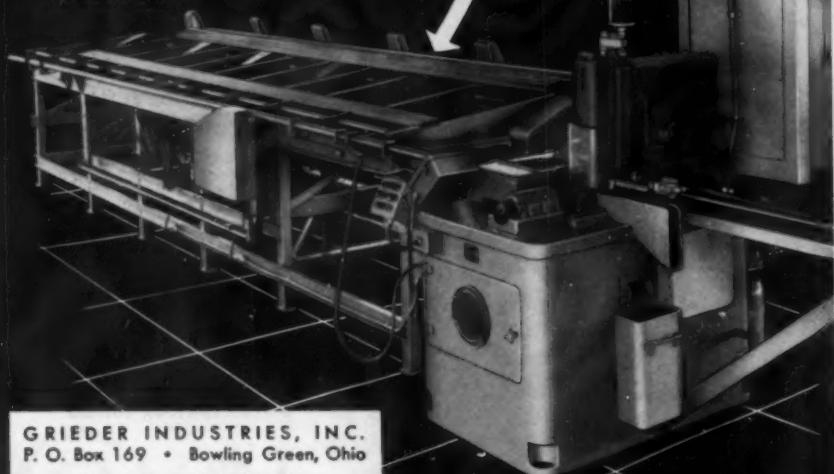
The Grieder automatic loader and feeder holds up to 15,000 pounds of tubing and will automatically feed the entire load through a Grieder Tube Cut-Off Machine without attention from the operator. Standard stock cradle handles 22' lengths. Shorter or longer capacities are available. Note! This equipment will also feed round stock to other types of machinery.

- Grieder Tube Cut-Off Machines cut tubing of any shape to any length faster than any other machine.

- Length tolerance plus or minus .002" on light wall tubing, .003" on heavier.

- Precision clamping dies prevent tube distortion and provide clean, quality cuts. Tube does not rotate.

*Write for literature. Tell us sizes of steel, copper, brass, aluminum or alloy tubes to be cut and production requirements.*



**GRIEDER INDUSTRIES, INC.**  
P. O. Box 169 • Bowling Green, Ohio

Please send bulletin describing  
Grieder Tube Cut-Off Machines.

NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_  
STATE \_\_\_\_\_



**TUBE CUT-OFF MACHINES**

# HAVING BORE SIZING PROBLEMS

WITH  
SIZE  
ROUNDNESS  
STRAIGHTNESS  
TOLERANCE  
SURFACE FINISH



## One piece • Job lot • or Production run

... Sunnen Honing levels out all hole errors from previous operations with a minimum of stock removal. Corrects out-of-round, chatter, waviness, bow, taper, barrel, bellmouth. Guarantees bore accuracy to .0001" with controlled surface finish as fine as desired.

From stock removal through finish sizing — from deburring through micro-fitting, Sunnen Honing is the most economical solution for internal work. No fixtures or time consuming set-up required; no chucking pressure to distort the hole.

Range .100" through 2.625" with stock tooling — and through 4½" with tooling built on order.

## INVESTIGATE

*the advantages of this fast stock removal process.* Ask us for a copy of Bulletin SP-11 or an equipment demonstration in your shop. No obligation is involved.

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**HONING**

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Canadian Factory: Chatham, Ontario



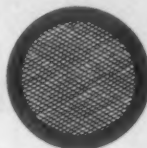
FAST STOCK REMOVAL



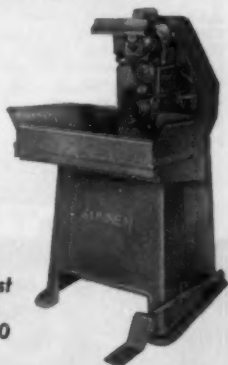
GEOMETRIC ACCURACY



PRECISION SIZING



CONTROLLED FINISH



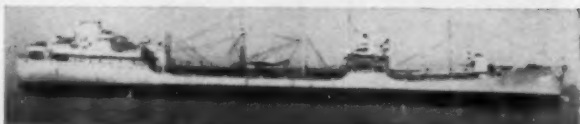
PRECISION  
HONING  
MACHINE

Average cost  
with tooling  
about \$1000

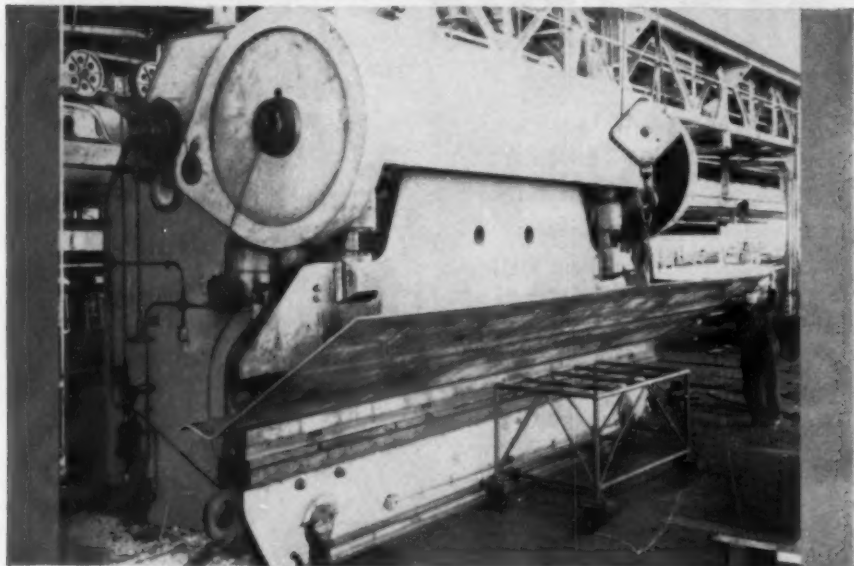
8880

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U.S.S. KASKASKIA is typical of many ships which have had extensive bulkhead and other repairs at Moore Dry Dock Company.  
Official U. S. Navy Photograph



## Moore Dry Dock SPEEDS MARINE REPAIRS



Fluted bulkhead plate being formed by Steelweld bending press in plate shop of Moore Dry Dock Company for bulkhead

renewal job on U.S.S. "KASKASKIA" (A027). Size of plate: length 26', width 6', thickness  $\frac{1}{2}$ "

Long a leading West Coast ship builder and marine repairs concern, the Moore Dry Dock Company, Oakland, California, has found a large Steelweld Bending Press to be a great asset in speeding the forming of heavy plate.

Ship repair, which constitutes an important part of the company's business, often requires replacement of large sections, such as bulkheads. This necessitates the forming of plates

to various shapes to accurately replace those removed. Because of the power of their Steelweld and the ease of making adjustments, this work is carried on efficiently and satisfactorily.

The entire line of Steelwelds has an enviable reputation for continuous high-production performance. We urge you to get the facts on their many outstanding features.



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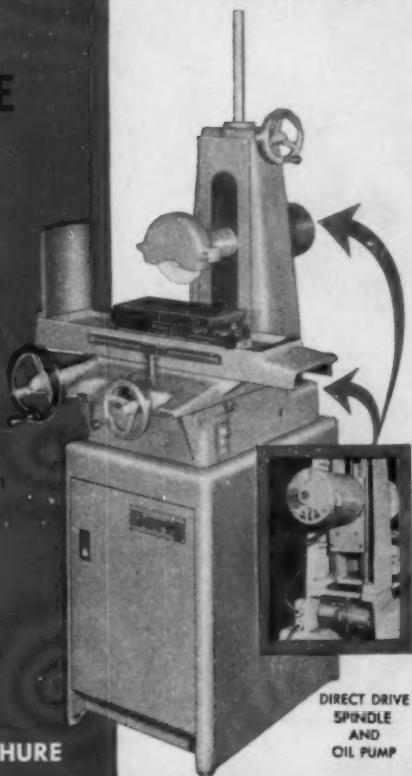
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LUBRICATION**

- Continuous flow, recirculating system
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- Reduces maintenance—*oils complete machine*

...and many other features included as standard equipment, all at a surprisingly low price!

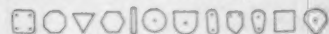
**WRITE FOR HARIG 612 BROCHURE**



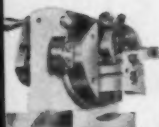
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Easily grinds various shaped perforators to  $\pm .0001$  accuracy.



Also, attachment to convert Grind-All into precision *Radius Dresser*.



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YOUR ONE SOURCE SUPPLIER**

**Negative rake indexable insert milling cutters**

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**Throwaway-insert boring bars**

**Half side inserted blade milling cutters**

**Clamp-type throwaway-insert tool holders**

**Positive rake indexable insert milling cutters**

**All sizes and types of throwaway-inserts: HSS; cast alloy; carbide; ceramic. Send prints for quotations on Negative and Positive rake inserts.**

**ONE FOR ALL ... ALL FROM ONE**

The wise way to buy Carbide, High Speed Steel, Cast Alloy and Ceramic Throwaway-Inserts, and Tool Holders, Milling Cutters, and Boring Bars is to buy from **one** knowledgeable source. Viking tool engineers know the applications of not merely **one** of these items, but of **all** of them as they so vitally relate to each other in order to obtain maximum cutting performance with minimum loss in time and materials. Because Viking engineers are pioneers in the throwaway-insert and tool industry, they are uniquely able to recommend the right tool and/or insert for your particular need. They are at your service.

**ASK FOR AN INTRODUCTION**



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MACHINE and TOOL BLUE BOOK



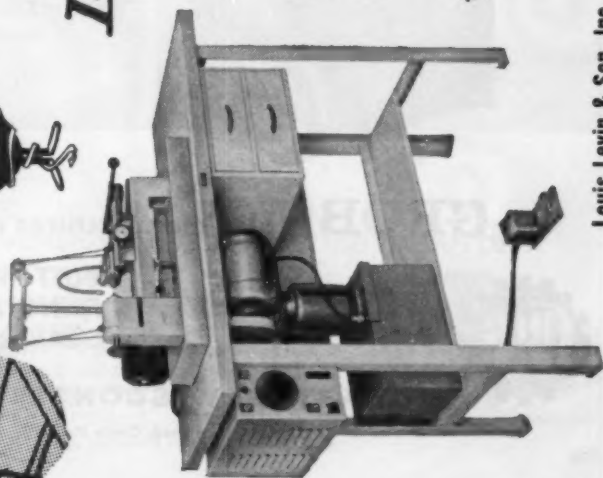
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DOWN TO .0016" with SPEED & ACCURACY

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\* Smallest commercial drill available.

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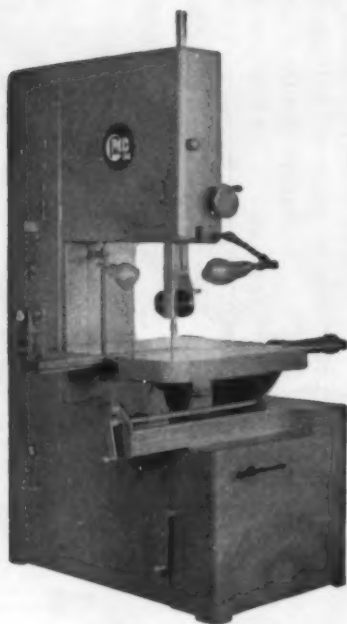


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FPM covers both cold and hot  
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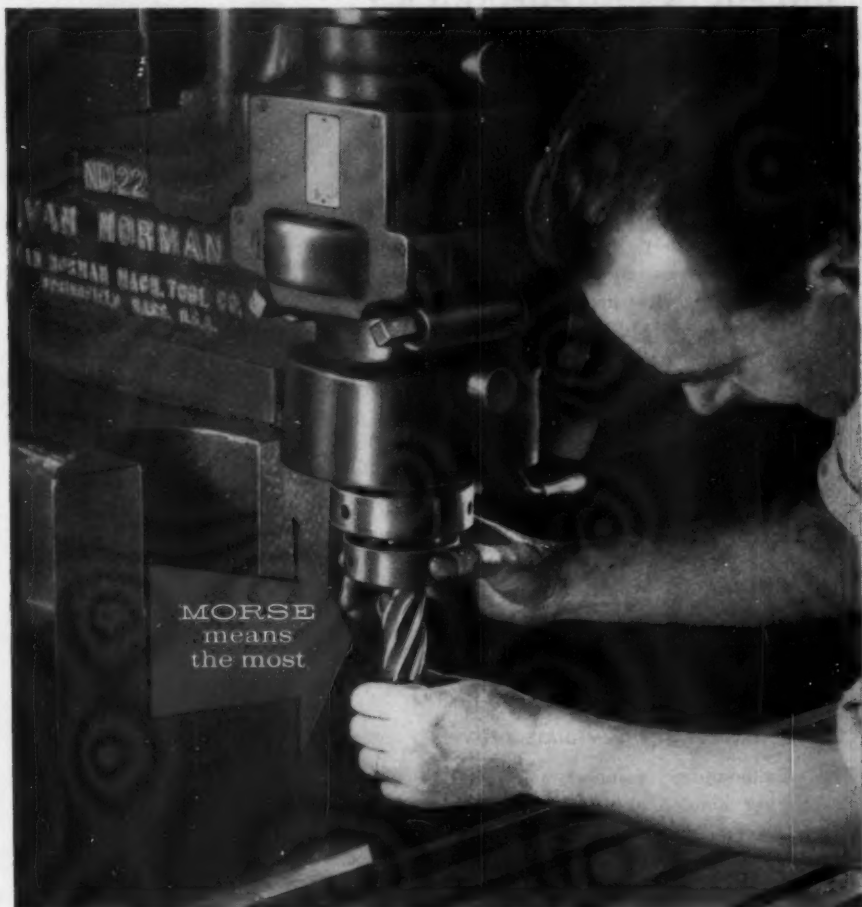


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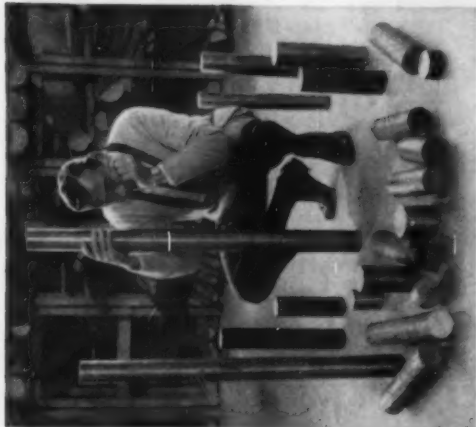
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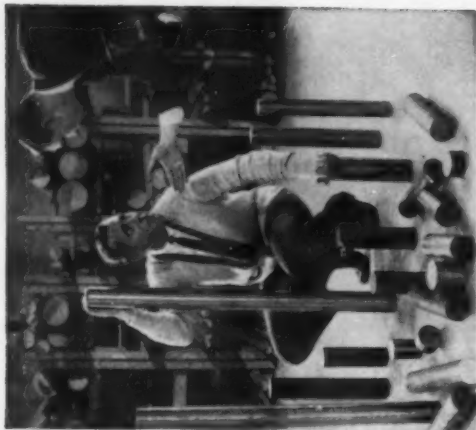
79

# NEW TOOL STEEL SERVICE

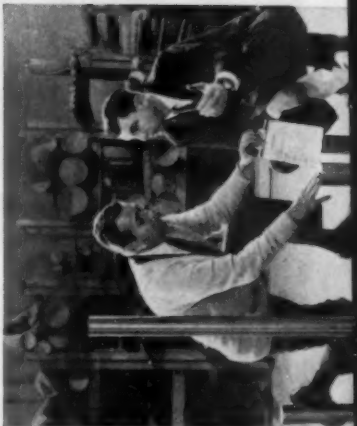
cuts  
inventory  
costs



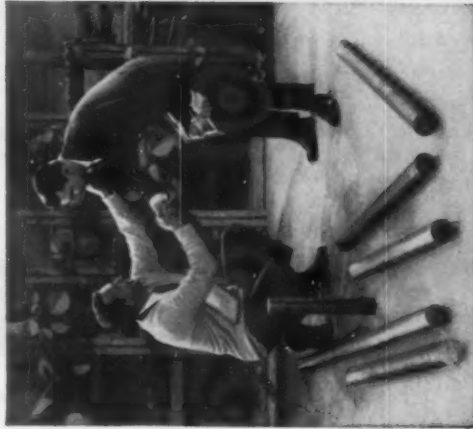
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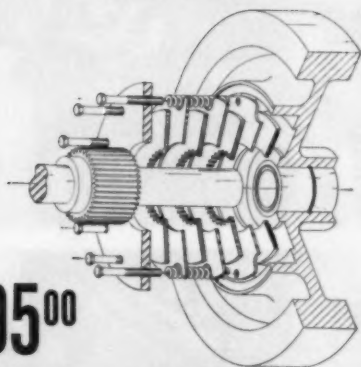


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PRICE FOR  
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**No. 6      60 Ton  
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\$2640<sup>00</sup>**

For unmatched production this 60 ton press can be factory equipped with the time proven Econo Air Clutch and Brake complete with controls for the amazingly low additional price of .....



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& TYPES 5-60 TON**

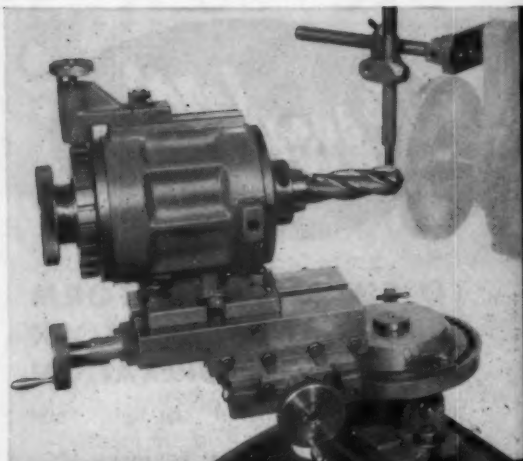
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Precision ball bearing workhead 6B mounted on compound slide for setting cutter to correct position when grinding end cutting flutes and radii. Other type workheads available.

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Radial Grinding Attachment D combines with Unit 1A for sharpening end mills with square, conical, or ball nose shapes.

UNIT 1A. Universal Cutter Grinding Fixture fits any universal tool or surface grinder.

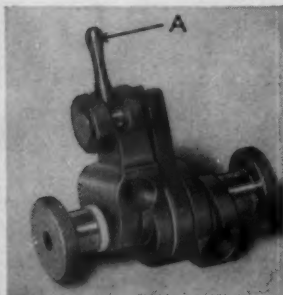


UNIT 4A. Radial Grinding Fixture for sharpening fluted end mills with square, conical, or ball-nose mills. The index disc provides for multi-flute cutters.



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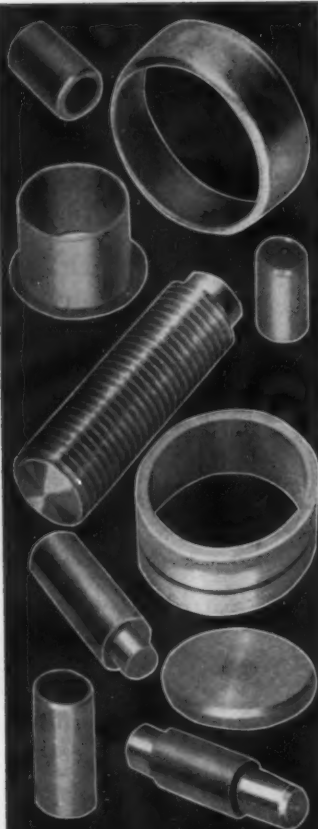
Smooth, positive positioning of finest dial indicator is readily accomplished by the fine-adjustment Sliding Swivel. Final precise positioning is accurately made by slight movement of convenient lever "A"



**ROCHELEAU TOOL AND DIE CO. INC.**

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SLIDING SWIVEL FOLDER**



## TO CUT OFF AND FORM TUBING AND BAR STOCK IN A SINGLE OPERATION

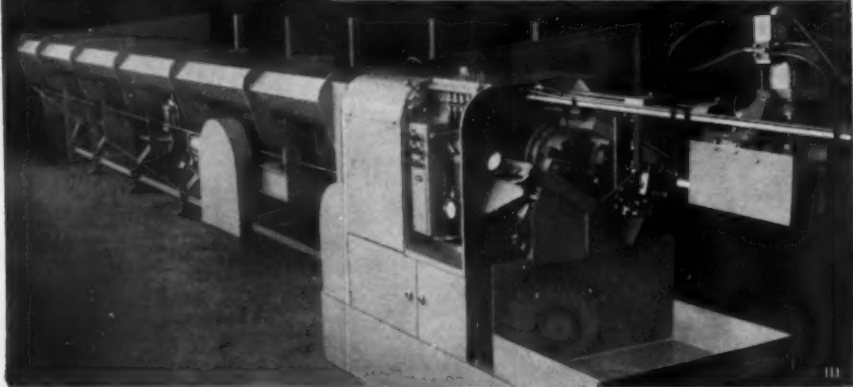
Here is a combination that feeds tubing and bar stock — automatically — to a fast, automatic cutting-off machine. Best of all, the pieces being cut off can be formed, grooved, flanged or chamfered at the same time.

There are models that handle tubing, pipe and bar stock from  $\frac{1}{8}$ " diameter up to solid bar stock of 3" OD and tubing up to 8" OD.

Why not investigate?

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**MODERN MACHINE TOOL CO.**  
2005 Losey St. • Jackson, Michigan



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MACHINE and TOOL BLUE BOOK

6-12

# DE LUXE SURFACE GRINDER

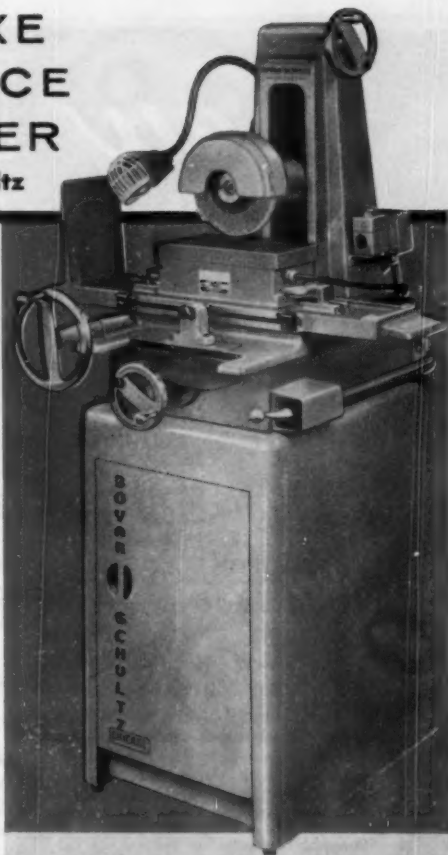
by Boyar-Schultz

A De Luxe Boyar-Schultz Surface Grinder incorporating many new accessories for those who want the ultimate.

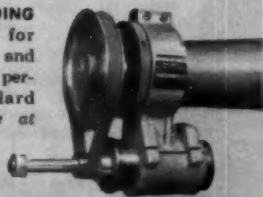
## FEATURING

- AUTOMATIC OILING SYSTEM. A motorized lubrication system providing continuous flow of lubrication to all bearing surfaces.
- OIL HARDENED AND GROUND tool steel inserts on saddle ways.
- NEW WHEEL GUARD to accommodate an eight inch grinding wheel.
- SLIP RINGS ON HAND WHEELS for vertical feed and cross feed permit the graduated dials to be set at 0 or any other desired graduation.
- NEW HEAVY DUTY BASE with welded structural steel inner frame for maximum rigidity and increased weight. Also available with patented built-in dust collector.

6-12 De Luxe Surface Grinder is available with hand or hydraulic feed.



**HIGH SPEED GRINDING ATTACHMENT** — for grinding angles and slots too small to permit using standard wheels. Available at additional cost.



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# *new* POPE

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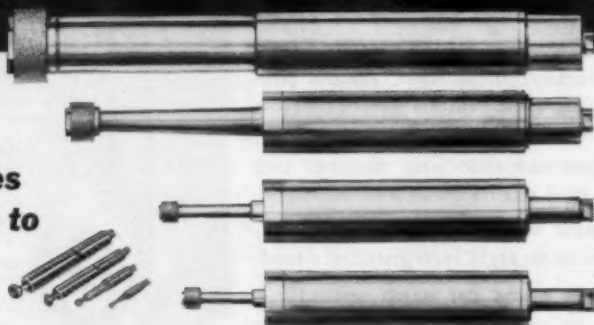
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and others

**with  
important  
new features  
that add up to**



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total eccentricity of shaft, measured in the tapered hole, will not exceed 20 millionths (.000020)

Assembled spindles are dynamically balanced with all rotating parts in full assembly to 25 millionths (.000025) amplitude of vibration. This assures low micro-inch surface finishes.

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Pope Spindles have the rigidity and the ability to take heavy cuts and produce uniform parts.

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Increased wheel life because the extra large shaft is rigidly supported by ample size bearings.

Saved operating time — one motor driving pulley serves all spindles in most cases.

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New concealed axial air flow coolant repelling finger increases bearing life and reduces maintenance expense.

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MACHINE and TOOL BLUE BOOK

## METAL CUTTING PRODUCTION *Notes*

### LET'S CLARIFY the metal cutting band saw picture

Modern industry's metal sawing needs are extremely varied, involving a very broad range of metals and production requirements. Obviously, no single type of metal cutting band saw blade can possibly meet all these cutting requirements on all types of band saw machines. To meet these varied needs, MILFORD makes available *three* types of band saw blades. The following will clarify the band saw picture for you . . . and help you select the best and most economical type for your specific cutting operations.

**THE MILFORD REZISTOR HIGH SPEED STEEL BAND SAW BLADE**—is made from genuine red hardness high speed steel and provides maximum resistance to both heat and abrasion. The ultimate for high-production cut-off sawing, it is the only blade recommended for use with the newer, heavy-duty band saw machines. It can also be used advantageously with some of the lighter duty machines when they are used to saw quantities of hard-to-machine metals.

**THE MILFORD INTERBAND SAW BLADE** . . . is a recent introduction made from a new type of alloy steel that contains carbide-forming elements and affords good wear resistance. Best suited for use on light-duty band saw machines where hard-to-machine metals are cut occasionally, it falls between the carbon steel blade and the genuine high speed steel blade in both price and performance.

**THE MILFORD FLEXIBLE BACK BAND SAW BLADE** . . . is the standard high-carbon steel type, ideal for general purpose cut-off, profile and contour sawing of all but the hardest-to-machine materials. It is also the preferred blade for friction sawing and for cutting most non-ferrous metals. On a price-performance basis, this blade is still — within its range of recommended applications — the best choice for general use on conventional types of machines.

**BUY FROM YOUR MILFORD DISTRIBUTOR** . . . a local businessman who stocks the tools and equipment you need. **You'll SAVE TIME, CUT BUYING COSTS and REDUCE INVENTORIES!**



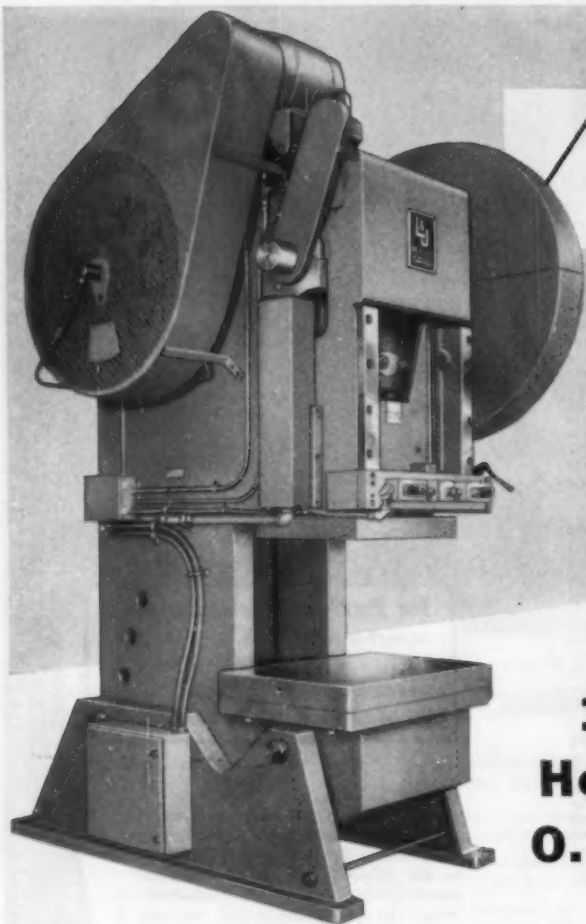
**For Maximum Performance —  
select a MILFORD  
HIGH SPEED STEEL Band Saw  
Blade for fast, low-cost  
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MILFORD High Speed Steel Band Saw Blades will give you important benefits that include: straighter, more accurate cuts; increased output . . . and the ability to saw stainless steel and other difficult metals quickly, easily and economically. When you specify MILFORD, you are sure of getting a *genuine high speed steel blade* . . . first in the field and still way out in front with users who buy on the basis of proved performance. Available only through your Local Industrial Distributor.



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## 125 Ton Heavy Duty O.B.I. Press

### STANDARD EQUIPMENT

Air clutch and brake. J.I.C. controls. Dual air valves. Adjustable gibs. Hard bronze crankshaft bearings. Forced lubrication.

**WRITE** for information. Also, other O.B.I. presses, straight side and gap frame presses.

- Completely new design in geared and non-geared types incorporates proven construction features.
- Exceptional rigidity insures long die life and close product tolerances.
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- Big die capacity—bolster area 42" x 29"—shut height 18", or to suit.
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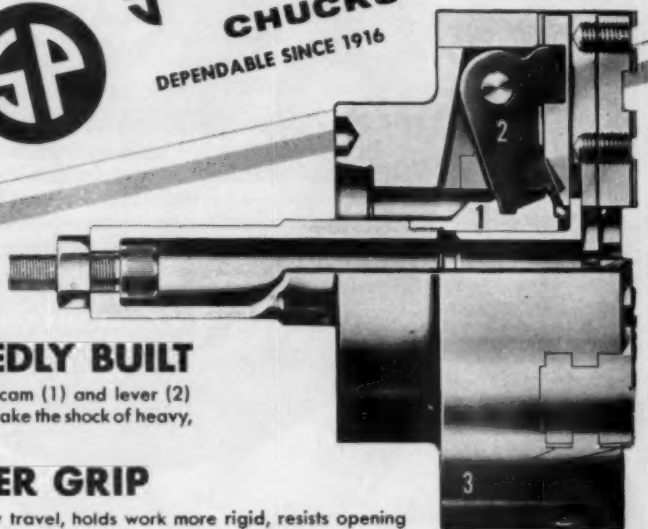
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Built for**

**INCREASED SPEEDS • HEAVIER FEEDS**



**SUPER POWER  
CHUCKS**

DEPENDABLE SINCE 1916



## RUGGEDLY BUILT

with improved cam (1) and lever (2) action that can take the shock of heavy, tougher jobs.

## GREATER GRIP

with longer jaw travel, holds work more rigid, resists opening of jaws by centrifugal force for extra safety.

## FLAME-HARDENED WAYS (3)

resist wear, prevent bellmouthing.



### ROTATING CYLINDERS

Bore sizes for air: 3" through 16". For hydraulic: 3" through 8" and larger. Speeds up to 3600 R.P.M. American Standard mountings.



### SELF-CENTERING and COMPENSATING CHUCKS

American Standard or serrated; 2 or 3 jaws; sizes 6 to 18".

A-687A



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A BASSETT COMPANY • IN GREATER CLEVELAND • ESTABLISHED 1916

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Rotating and Non-Rotating AIR and HYDRAULIC CYLINDERS • VALVES

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in Surface Grinding . . .  
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The flexibility in application of your Blanchard Surface Grinder enables you to attain peak production at lowest cost on hundreds of different grinding jobs. *But, it is very important that you use the right wheel for each job!*

Blanchard makes and stocks a great variety of silicate, resinoid and vitrified bonded wheels and segments. Ask your Blanchard representative to help you select the wheel—or wheels—best suited to your requirements. Call or write him today. And may we send you a copy of "The Art of Blanchard Surface Grinding" (4th Edition)?

THE BLANCHARD MACHINE COMPANY  
64 State Street,  
Cambridge 39, Mass., U. S. A.

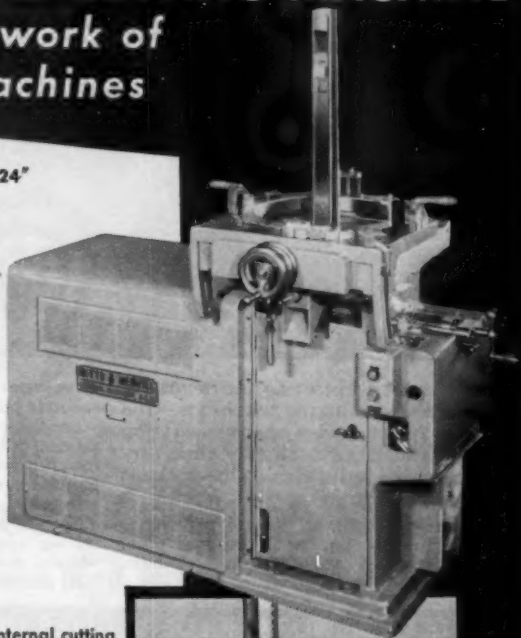


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# AMAZING NEW **M&M** KEYSEATER AND VERTICAL CUTTING MACHINE

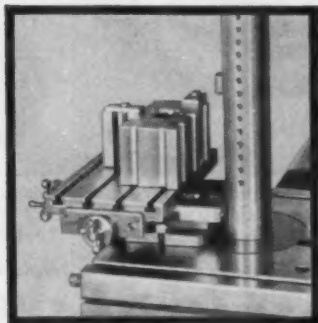
*does the work of  
many machines*

In addition to a keyseater that cuts internal keyways up to 3" wide x 24" long, the new hydraulic M & M is a handy tool room machine and can be easily adapted to special production jobs other than keyways. A wide variety of internal or external cuts, serrations, grooves and teeth can be rapidly made on this machine. With a combination tilting table and index table (shown on machine at right) straight or tapered bores and accurately spaced multiple keyways or splines may be cut at any degree of the circle. Send us prints of your cutting problems.

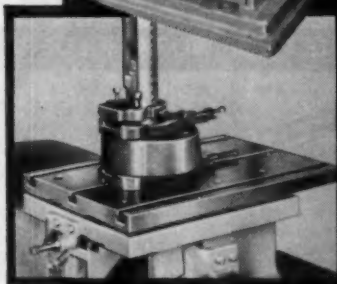


Right: Set-up for internal cutting

Below: Set-up for external cutting



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BUILDERS OF MACHINERY  
SINCE 1854

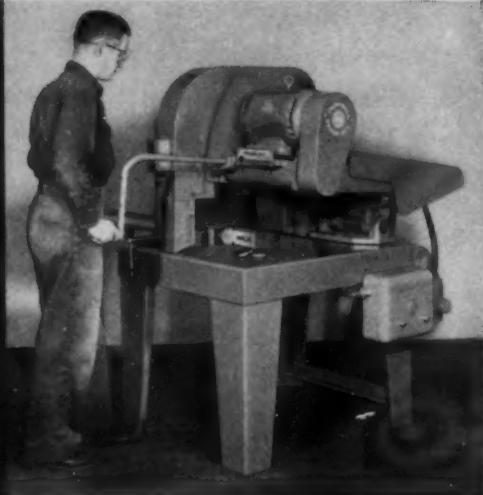
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**Big capacity** • cuts 4" round or square solids, 6" diameter tubing or standard pipe, 6"x1" flat stock, 6" angle iron and 8" channels. Cuts practically all metals.

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### VARIETY OF WORK HOLDERS GIVES UNUSUAL VERSATILITY



V-block with quick-action clamp



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2-way clamp for irregular shapes

• Choose the work holders you need from several optional arrangements. These include the vise-type holder shown on the ma-

chine at top, plus the V-block, angle-cutting and 2-way clamp fixtures above. Screw-type and quick-action clamping interchangeable.

*Write for details on the new Model 2-A Sever-All abrasive cutting machine. Ask for Bulletin DH-299*


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## with **H&G** style DMS Stationary Die Heads and Throw-away *Insert Chasers*

On your turret lathes and hand screw machines, get big savings in dollars and time with H & G Stationary Die Heads because:

**1. Economy!** You can buy 3 to 5 sets of H & G Insert Chasers for the price of 1 ordinary set. You can let used H & G Chasers accumulate, with less investment, to be ground more economically at one setting. Or, you might find it less expensive to throw dull Chasers away.

**2. Rejects reduced!** The H & G Insert Chaser is held rigidly in the Chaser Carrier. The Carrier, being larger in area than ordinary chasers, affords greater Chaser "guiding power" for reducing chatter, taper and poor starts.

**3. Thread close to shoulders!** H & G Chasers extend beyond the Die Head face, making extension chasers unnecessary.

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**4. One Die Head gives big threading range!** The Style DMS 102 (4 chaser) or Style DMS 152 (5 chaser) Die Heads, for instance, cuts from No. 5 to 1 1/4" Dia. with only 4 ranges of Carriers. Other sizes available for smaller or larger ranges.

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BEHIND THE  
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OF THE NEW**

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STUBBY**

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BAR AUTOMATICS SAVE TIME,  
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Jarvis Stubby, a new screw machine stub tap developed for production tapping on bar automatics, is designed to cut costs by eliminating down time and improving performance.

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The area directly behind Stubby's threads has been necked down to below the root diameter. This "necking" creates more chip room . . . reduces drag . . . facilitates application of cutting oils or coolants to the cutting edges for longer tap life.

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Its short threaded section and shorter overall length make Stubby a much stronger tap. You use standard size bushings (eliminating the need for special drills when making tap holders), because Stubby's shank is ground to standard fractional dimensions. Depth of thread is not a problem; for the combination of length of thread and length of necked shank is equal to the thread length on equivalent standard taps.

**STUBBY BEATS COSTS —  
CUTS DOWN TIME**

With Stubby you no longer need to alter standard taps for short clearance jobs. This means you cut costly machine down time, operator's time and minimize the possibility of having inconsistent tap performance.

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Stubby is available from stock in Spiral Flute Bottoming #SF-01, Spiral Point Plug #SP-50, and Bottoming Spiral Point #SP-70. All 3 styles available in machine screw sizes #2 thru #10. Other sizes available on request. WRITE FOR STUBBY LITERATURE AND TAP CATALOG.



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DRILLING  
& TAPPING  
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ALL  
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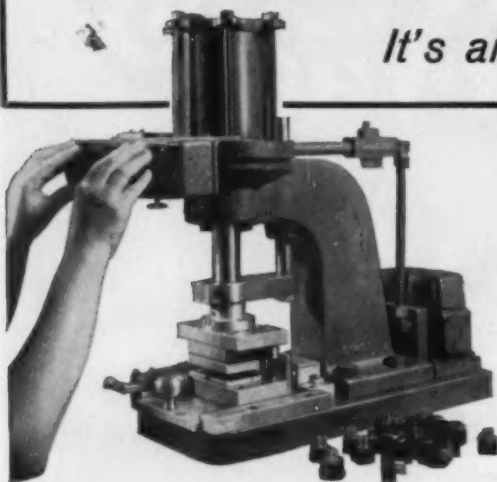
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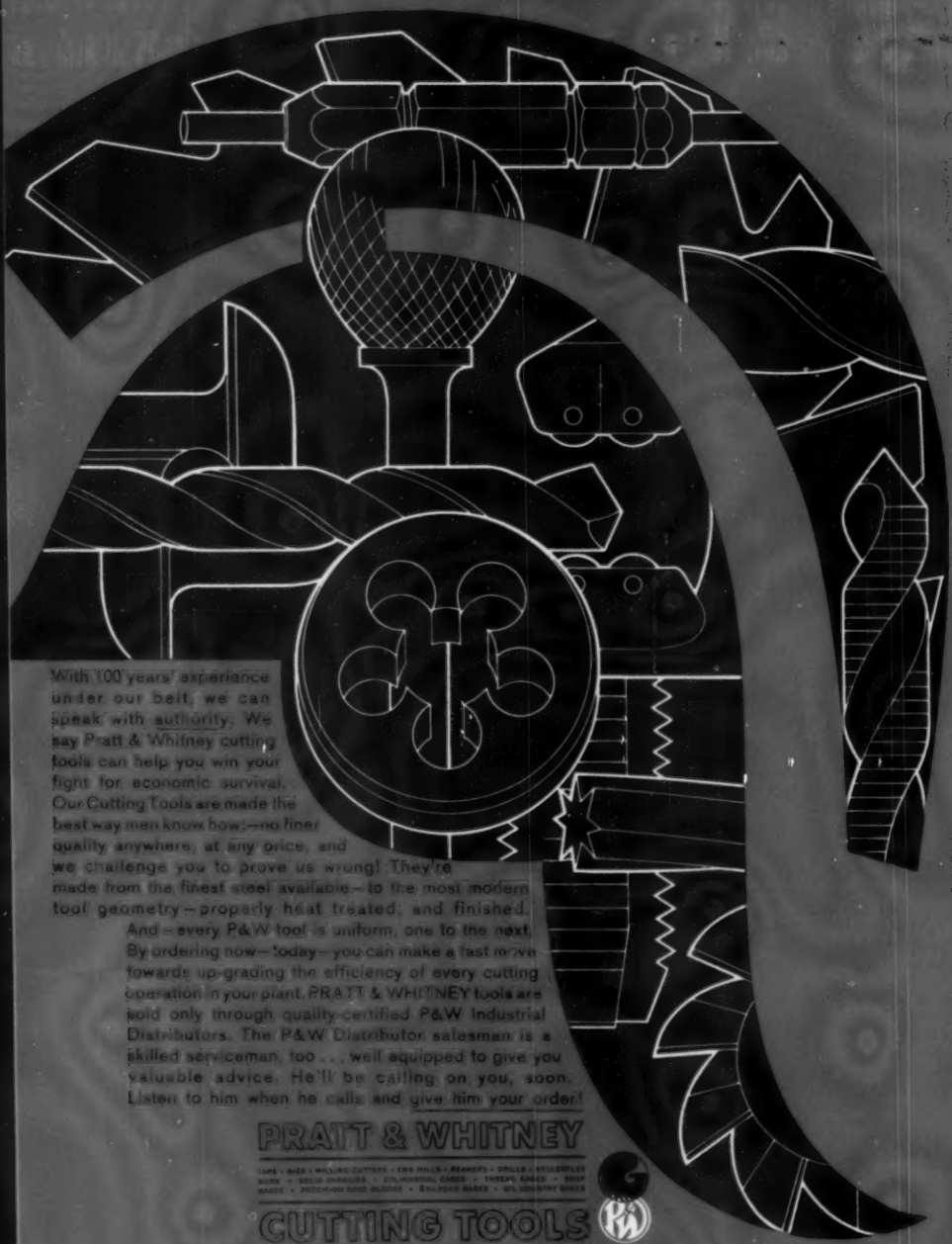
HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSCURENCE

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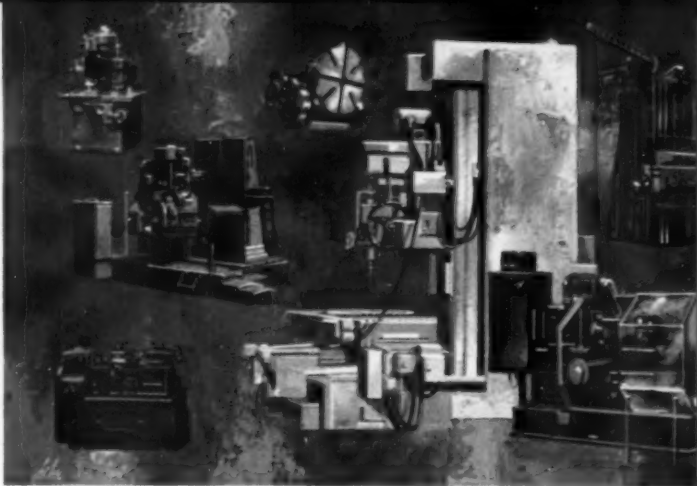
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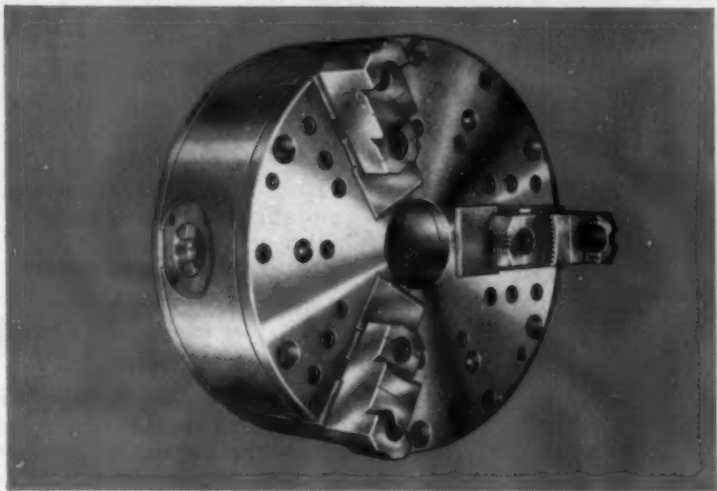
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In addition to this unique, new principle, this chuck offers such features as over-tightening protection, operator protection, higher speeds, center-hole chucking and many more. For details, write us at the address below, Department 144.



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## Features In This Issue

**AMERICA'S AMAZING ABILITIES** well describes the work of Henry Viscardi, Jr., president of Abilities, Inc. In an interview, he comments, "How disabled a man is isn't nearly as important as whether he wants to work or not." Many vital questions of interest to disabled worker and to industry in general are answered with the thoroughness of one born with stumps instead of legs. ....Page 102

**CHIPLESS MACHINING** will be discussed each month by columnist Charles H. Wick, an authority and author of a book on the subject. This month's column reviews cost-cutting advantages, higher production efficiencies, improved product quality, limitations of chipless machining, and the future of chipless machining. ....Page 128

**NOW FINISH MILLING WITH THROWAWAYS** is the subject of Ray Ruckel, BLUE BOOK'S new columnist for CUTTING TOOLS. Ruckel explains why throwaway-insert type milling cutters were not widely successful several years ago and describes a cutter body design that now permits practical use of throwaway inserts for finish milling. ....Page 135

**HOW THE NBS USES THE NEW WAVE-LENGTH STANDARD IN CALIBRATING GAGE BLOCKS.** With the increasing demand for ultra-precision measurements, the higher accuracies obtainable through the use of the new wave-length standard broadens the application of gage blocks. The article discusses gage block applications in addition to describing the National Bureau of Standards' calibration procedure. ....Page 110

**IF TAPE PREPARATION IS HOLDING YOU BACK, THERE'S NO NEED TO POSTPONE NUMERICAL CONTROL.** Managing Editor Jim Pond reports on a service available to industry that enables the smallest of shops to explore the cost-saving potential of numerical control without the need for expensive computer equipment and highly trained personnel. ....Page 118

# NEW!

## Logan

14" LATHES  
BEST DOLLAR VALUE  
IN THE LATHE FIELD

These new Logan 14" swing lathes are **DEPENDABLE**. Their capacity permits a broad range of machining operations. They have a 14 $\frac{3}{4}$ " swing over bed, a swing over saddle cross slide of 9", and a center distance of 28". Logan lathes are **ACCURATE**. The ball bearing spindle has a 1 $\frac{1}{16}$ " hole and a draw in collet capacity of 1 $\frac{1}{16}$ ". The variable speed drive (40 to 1400 RPM) adjusts while running —no need to stop and shift belts! Also, the two V-ways and flat ways are precision ground. Logan 14" lathes are **RUGGED**. The 10" wide and 56" long lathe beds are braced by oversize ribs to withstand torsional stresses. The Logan 14" lathe is your best dollar value. No other lathe in this price category offers you this same big work capacity with variable speed drive.



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## WITH THE EDITOR :

**B  
B**

### *The Big "Push" to Chipless Machining*

**T**echniques for cold-forming metal to shape are being explored and exploited at an accelerated pace. The advantage inherent in "moving" instead of "removing" metal is that the raw product and the finished product represent substantially the same amount of material.

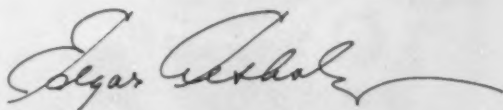
Of the three elements which constitute the cost of a metal product (material, labor, and overhead), the cost of the material is frequently the predominant one. When it is realized that an average of 30% of the raw material weight of the cut-machined part ends up in the scrap pan of the machine tool, the appeal of "chipless machining" becomes apparent.

Forging, hammering, and coining are rooted in antiquity. Wire drawing, cold heading, and a few other versions of the art of plastic deformation have appeared in more contemporary times. In the main, however, the bulk of metalworking technological development has been concentrated in areas where cutting processes and equipment have been involved.

Today's changing emphasis stems

from a number of factors, in addition to the obvious one of saving material. Many chipless machining techniques are decimating production time. Products with superior metallurgical properties are being obtained. And what is more, shapes and sizes impractical to create by cut machining are now available to the product designer.

Recognizing an urgent need for greater editorial attention to chipless machining, **BLUE BOOK** This month presents the first of a series which will explore every facet of this mushrooming field. The author, Charles H. Wick, is a familiar figure in metalworking circles. A graduate engineer, product designer, and former managing editor of *Machinery* magazine, he is presently a vice-president and director of editorial relations for Dudgeon, Taylor & Bruske, Inc. We feel honored that our readers can now share his comprehensive, complete, and unbiased knowledge of chipless machining.



Edgar Altholz





# AMERICA'S AMAZING ABILITIES

Abilities Inc., Albertson, Long Island, is a bustling metal-working and electronics plant having but one employment requirement of its 385 people: You have to be seriously disabled to get a job there. In vigorous competition with other firms, Abilities pays prevailing wages, asks no favors, accepts no charity.

Here is the substance of a recent interview the editor of BLUE BOOK had with the company's inspiring president, Henry Viscardi, Jr.

## INTERVIEW:



Q. What do you think, Hank, is the best approach to the hiring of the disabled in manufacturing?

A. The first thing we have to do in the metalworking trades or anywhere else in American industry is to have a broader concept and not feel that we are working under restraints and doing something charitable for disabled workers. If we begin to think in terms of how comfortable and convenient it is to move around in a wheel chair instead of walking around, a wheel chair isn't as frightening to us any more. You have seen me walk around and I walk around pretty well, even though I have two artificial limbs. But you ought to see me when I get into a wheel chair. I go spinning around corners and I am the whirling dervish for sure.

We first have to overcome some blocks that we seem to have that are latent—we don't recognize them, they've been there a long time—that people with disabilities cannot be as good as others. The man who shows up at the employment office in a wheel chair or on crutches or with one arm off, or with other problems that are disabling, immediately presents certain barriers to the mind of the recruitment officer or the employment manager. He presents barriers to the training supervisor, who hasn't seen him yet, he presents barriers to the foreman, who after all, wants the best of material and the best of men to turn out the product that he is going to answer for at the end of the month. The foreman rightly says to himself that he won't take any chances with this marginal "commodity."

Secondly, we have to recognize that disability never became a common denominator of any kind. People are

people, and percentage-wise there probably as just as many lazy loafers in wheel chairs and on crutches as there are in the average population, and disability never made great people or great potential workers any more than red hair or brown eyes did. So if we can judge them then as people, accepting them without the barriers that are presented because they are different in some way when we first look at them, half the battle is won. The rest of it lies in the techniques of training, and in making certain modifications and adaptations of tooling and equipment, which should not be expensive; in fact, which would flow in most naturally from an interested worker seeking to adjust himself to his new environment.

Q. When a proposal for a job comes in do you automatically accept it or reject it on the basis of the capability of your present personnel? In other words, suppose some job came in which you could not handle, would

you go out and look for people with the specific skill to do this, or would you retrain the people you have to do it, or would you reject the job?

A. It would depend on the potential in it for us. Take our motor department, for example. We are pretty proud of it. We think we have a real future in this, in building such things as synchros and resolvers. When we first went into this, before we could build up our own capacities so that we knew there was a five year curve we were planning on, we bought our special skills. Now as we get deeper into the motor program, we realize we are in it for keeps, and we train our own people. The fact that we are disabled has nothing to do with this.

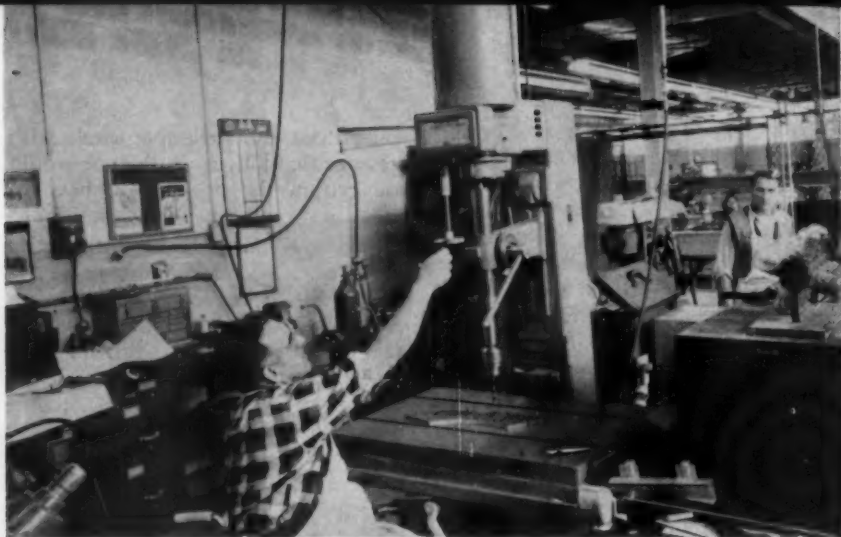
Q. In other words, the considerations are primarily economic and not sentimental?

A. Precisely.

Q. What are some of the machine

1. This wheel-chair case has been able to operate a surface grinder after a platform and a short ramp approach were constructed in front of the machine.





2. With the speed-selector handwheel lowered through an extension rod, this drill press can be operated with considerably less fatigue—even for a non-disabled person.

tools which your people have been able to operate?

A. It would be a lot easier for me to tell you, if I could think of them, what we have not been able to operate. For example, when we first tooled up a turret lathe, one of our men operated it from a wheel chair. This man was a paratrooper and had both legs blown off in World War II. We were able to fixture that machine so that he ran it efficiently and completely. It might also interest you to know that for certain operations we were able to adapt that turret lathe for a blind man to operate.

Q. Doesn't that additional fixturing and tooling time put you at a competitive disadvantage?

A. No, because this is a bio-engineering study that we perform separately in our research and teaching group, the Human Resources Foundation. HRF would undertake a study to find out how we could adapt a turret lathe to a specific disability.

Having accomplished this, we'd be in business to ask, 'Where can we sell this?' What is more, the research would be made available to anyone in industry. So you see, by our own accomplishment we have helped to break down that barrier.

Likewise, research that we've done in regard to posture and comfort for the disabled worker has proved to be of infinitely even greater benefit to the so-called normal worker. A great deal of our research is conducted on this premise. Research in motivation, for example, the will to work. What an important topic this is for everyone!

Q. Is it your wish to see industry eventually absorb all disabled workers, or would you rather see more plants like Abilities around the country?

A. I would much prefer industry absorb the disabled. Frankly, I look upon Abilities more as a demonstration laboratory to show what these people really can do. Because our country is so big, I would like to see

more plants like Abilities established in regional areas.

Here, under one roof, we have approximately 385 people operating competitively, meeting quality standards and delivery schedules in the metalworking and electronics fields. What we learn about the performance of these people is being passed on to industry so that it can take full advantage of this segment of manpower available everywhere in America.

Think of it this way. I believe there are in Abilities right now ten or twelve cases of industrial accidents. Now for every year that these people work, we are saving some insurance carrier approximately \$100,000. If we could get more industrial accident cases back to work, it would be better for the individuals—they'd be healthier and happier working than sitting home collecting compensation.

**Q.** How about your own safety record right here in Abilities?

**A.** Our experience in Abilities has

been so good that we are presently downrated 47%. We have a credit, and it's been as high as 52%.

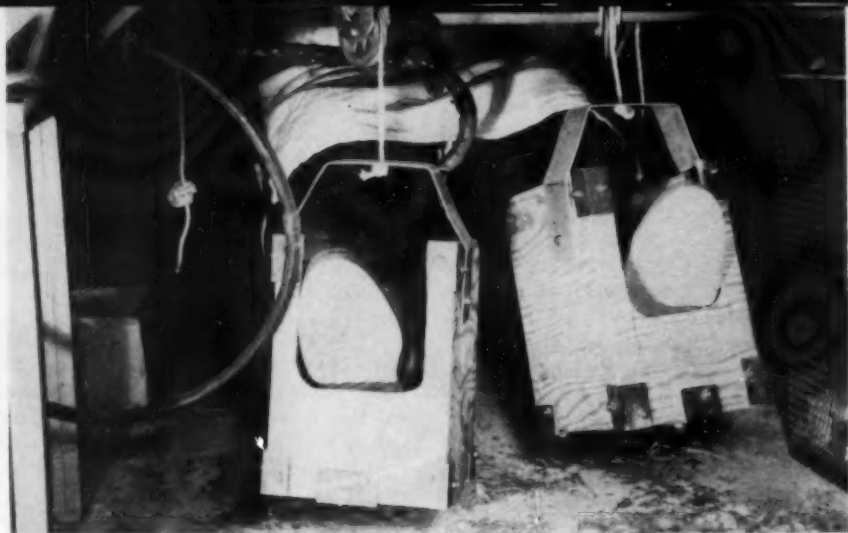
**Q.** Has what you've done so far resulted in the absorption by industry of the disabled worker to any great extent?

**A.** Indeed it has. We have men who have never worked before because of their disability, or who have never worked since the onset of their disability, who have now not only successfully worked here for two or three years, but have left for better jobs in bigger companies where they are doing very well. Some of our men are supervisors and foremen in other companies in related fields.

Part of our function, as I see it, is to "graduate" people whom we have trained. We have to do this with discretion, however, because if we bled off our skilled leaders, we couldn't answer the demands of our customers. We are sending out on

3. Arthritis has left this worker's spine rigid from neck to hips, but he runs a belt sander on a full-shift basis without any adaptation of the equipment.





4. A person whose legs have to be in an elevated position is today gainfully employed as an adept bench hand, thanks to a pair of simple foot slings. Readily detachable, the devices permit him to be transferred from one bench station to another.

the average of 2.4 people per month. Remember, these are people who came from the shadows, that nobody would employ, but who built up their skills and physical capacities here.

Q. Does Abilities require any kind of pre-employment examination?

A. All of our people are severely disabled and most of them would be rejected by the pre-employment physical examination of the average company. Yet statistics show our safety record is one of the most outstanding in American industry.

We have no pre-employment physical examination. This has been done for a unique and interesting reason. In order to establish the best area for research, I said at the outset that we would have no pre-employment medical examination, no pre-employment psychological examination or aptitude evaluation. We take people in no matter how disabled who want to work. We want this to be a "purest"

laboratory. No, from our viewpoint, how sick a man is, or how disabled a man is, isn't nearly as important as whether he wants to work or not—his motivation, for want of a better word. If he wants to work, we can overcome all the problems of the disability.

Q. Don't you think that he might want to work so badly that he might fail to reveal some unknown disabilities to you, and you would be running a risk there?

A. Yes, I do. I would not advocate this policy for industry. I advocated it for us, because we wanted to find out all we could about these disabled people, and we didn't want any preconceived notions that would keep them from coming to us. We wanted to have all the experience—adverse and wholesome—out of which we could accumulate knowledge to pass on to industry. Now, I think however, that we are beginning to feel that



5. A totally blind worker assembles connectors on a jet-engine analyzer by means of an air screwdriver and a holding jig. His production performance compares favorably with that of a sighted worker.

industry should update its pre-employment physicals to meet the new concepts of what disabled people can do. Some of industry's physical standards of recruitment have not been updated in many years, and some industrial medical men need the advantage of this new knowledge of what we know about things like heart disease, epilepsy, and paraplegia.

**Q.** How about the attendance record of these people?

**A.** It's outstanding. The average absentee rate in American industry is 3.8 days per 100 working days. Ours is about 1.1.

**Q.** Does the enthusiasm of your people wane after they have been on the job for a period of time?

**A.** We have to strive continually to maintain a high level of motivation. This comes from good management, interest in the worker as an individual, and genuine love for him. It involves

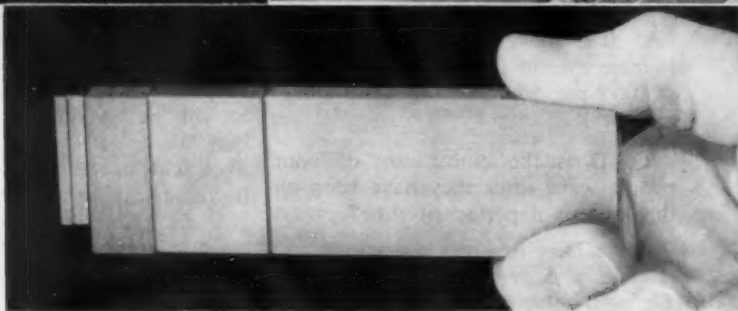
an appreciation for his dignity as an individual, his right to be informed about what's happening in his company, and his personal problems. I think there is a basic weakness in suggestion systems, where your payoff is in the form of a check. It's a poor substitute for a "thank you," the sense of real appreciation for something that somebody has done for the company and for himself.

When we put a person to work after everyone else has rejected him, we acquire a highly motivated individual. But we know that if we don't keep the level of job satisfaction up, he will be no different than anyone else. We've got a wonderful person to work with in the disabled worker, and the chances are that he is going to give us back just a little bit more because this is his priceless opportunity. But basically what he requires—and this should be comforting to industry—is pretty much the same as anybody else.

How the NBS uses the new  
wave-length standard in

## CALIBRATING

Parallelism of a set of gage blocks being measured with an interferometer recently developed at the Bureau.



# PRECISION GAGE BLOCKS

By calibrating from five to six thousand gage blocks each year, the National Bureau of Standards of the U.S. Dept. of Commerce is providing industry with one of its most effective means of monitoring the increasingly close dimensional tolerances. Calibrations with uncertainties as low as one part in a million are available, permitting industry in turn to use the gage blocks for calibrating other equipment with only slightly less accuracy. However, gage blocks of the highest attainable accuracy are also being applied directly in "custom" production work on critical projects.

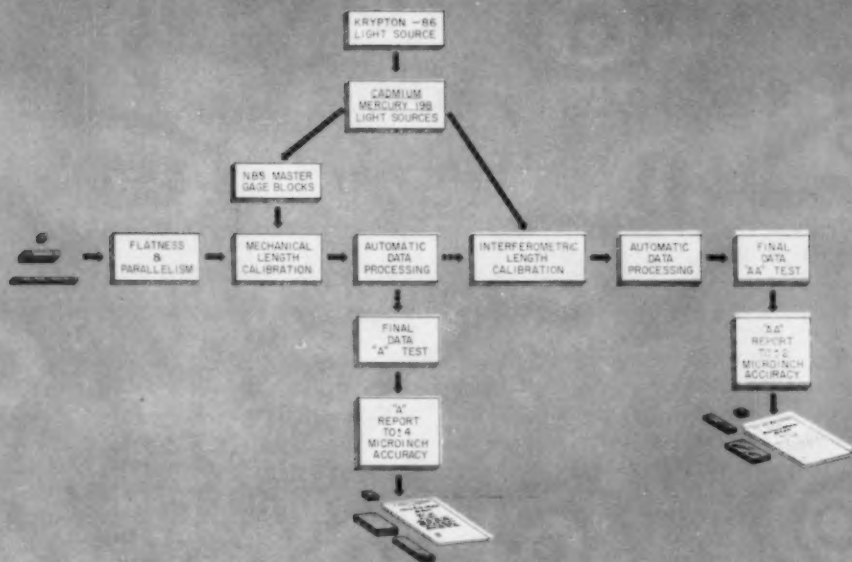
In principle, it should be possible to provide calibrations of substantially higher accuracy than in the past, as a result of the recent adoption of a wave-length standard of length and better auxiliary equipment, such as interferometers. A continuing obstacle, however, is the dimensional instability of even the best alloys commercially available for manufacturing gage blocks. In special cases it has been possible to certify gage blocks to an accuracy of better than one part in five million. Research is now under way at the Bureau to find alloys which, it is hoped, will permit

regular calibrations to one part in ten million.

## Gage Block Applications

In its simplest form, a gage block is a rectangular block of steel with square or oblong cross section and with two opposite edges—the gaging surfaces defining its length—ground and lapped flat and parallel. These extremely flat and highly finished surfaces make possible two very useful characteristics of gage blocks. They can be measured directly in terms of wave-lengths of light by interferometric methods, in which light beams are reflected from the gaging surfaces. Also, by carefully sliding a gaging surface of one block over a gaging surface of another, the two can be "wrung" together so that they offer considerable resistance to separation; in this way, a series of blocks can be assembled for a required length.

A typical set consists of eighty-one gage blocks, with sizes ranging from .05" to 4". Of the eighty-one, there are ten blocks with lengths from .1000" to .1009", in steps of .0001"; fifty blocks from .101" to .150", in steps of .001"; seventeen blocks from

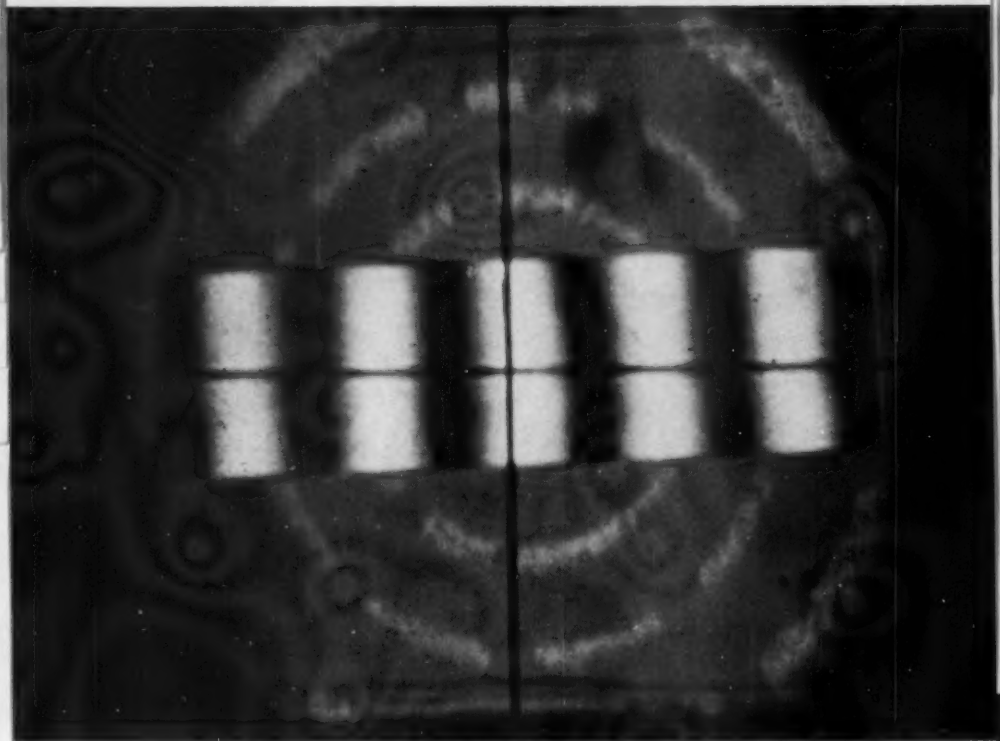


Block diagram of the procedure followed by the National Bureau of Standards in calibrating precision gage blocks.

.20" to 1.00", in steps of .05"; and single blocks with lengths of .05", 2", 3", and 4". With these eighty-one blocks, over 100,000 combinations of measurements are possible in steps of .0001". By the additional use of .100025", .100050", and .100075" blocks, combinations can be made in steps of as little as .000025".

Many industrial and scientific laboratories maintain one or more sets of master gage blocks which are used only to calibrate working sets; and the latter are used for direct measure-

ments or for calibrating various kinds of measuring instruments. Among many other applications, the blocks serve to test the accuracy of micrometer calipers, and of ring, plug, and snap gages; to check the lead of screw-thread gages; to calibrate strain gages and mechanical or electronic indicating gages and comparators; and they are used with sine bars for precision angle measurements. At the Bureau they are often employed in measuring of derived quantities. In the calibration of precision ba-



To determine the degree of flatness in gage blocks, interferometric patterns such as these are obtained. Broad dark lines on the surface of this block indicate a high degree of flatness.

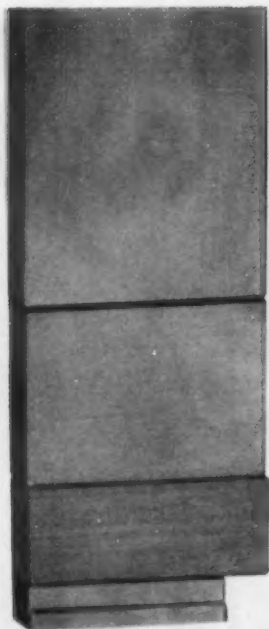
rometers, for example, gage blocks are used in determining the height of the mercury column.

Precision gage blocks are classified as Grade AA (laboratory quality) and Grade A (inspection quality). Laboratory quality blocks are manufactured to within a few microinches of their nominal length; that is, the length indicated on the blocks. As mentioned previously, gage blocks exhibit a dimensional instability with the passage of time, an effect that is in addition to changes due to wear.

In the case of master blocks that are seldom and very carefully handled, the change due to wear is quite small; while the change caused by instability may in some cases amount to several microinches per year. It is therefore considered necessary to recalibrate master blocks at intervals of from one to several years, depending on the type of usage and level of accuracy.

#### **Calibration Procedure**

The first step in the Bureau's calibration procedure is to test the gaging



By exerting a slight pressure, gage blocks can be wrung together to make highly accurate measurements.



surfaces for flatness and parallelism. Blocks with excessive deviations in either of these respects are as a rule not calibrated; or, if they are, the accuracy of the measurements is not certified. In maximum precision applications, it may be necessary to take into account even fairly small deviations, since lack of flatness or parallelism means that the length of the block will vary from point to point on the gaging surfaces.

The lengths of all blocks submitted for calibration are then determined by comparison with NBS master blocks of the same nominal size. These master blocks are calibrated against the laboratory's reference

standards—light waves produced by cadmium and mercury 198. The lengths of these light waves are known very accurately in terms of the new international standard of length, the wave-length of the orange-red spectral line emitted from atoms of krypton 86. Electromechanical comparators of the dual transducer type show the difference in length between master block and test block. Each test block is compared at least twice with the master blocks. Tongs are used to handle the blocks so that variations from the 68° F temperature maintained in the laboratory will be held to a minimum.

Data from the electromechanical



Recording length measurements obtained with one of the electromechanical comparators used in calibrating gage blocks.



comparators are recorded on punched cards for processing in a high-speed electronic computer which calculates the deviation of each block from its nominal length. In arriving at an average value for the block, the computer examines both comparisons for excessive spread or variation between their values. When too much spread is

noted, the block must be recalibrated.

If the set is being given an "A" calibration, the test is now complete and the final report is assembled. This report consists of a table showing the nominal size, identification, deviation from nominal length of each block, and any excessive deviations in flatness and parallelism. A text



Inserting an optical flat, to which gage blocks have been wrung, into one of the interferometers used to measure the lengths of the blocks by means of light waves.

explaining the calibration is attached to the report.

When accuracies of a higher degree are required ("AA" calibration), interferometric measurements with light waves are made. Because the blocks are wrung to steel optical flats for measurements, the gaging surfaces must be completely free from burrs, and substantially in "new block" condition. After wringing, sufficient time is allowed for temperature equalization. The flats are then placed in the interferometer where the upper surfaces of the blocks and the flat become mirrors in the optical system.

Two interferometers, in which cadmium and the mercury isotope 198 are the light sources, are used to make two separate sets of measurements. The light from these sources consists of a number of monochromatic radiations (spectral lines), one of which is used from each source. Two determinations are made, using each source in turn; the blocks are then wrung to another optical flat, and this operation is repeated.

Each of the spectral lines produces a pattern of optical interference fringes which serves, in effect, as a finely divided scale. One division on these

NOMINAL VALUE (inches)	ACCURACY OF CALIBRATION (microinches)	REMARKS
.010 to .090	$\pm 3$	Blocks in this size range are usually warped and do not warrant calibration to a higher accuracy. If errors in flatness are not excessive, it may be possible to calibrate blocks 0.040" and thicker to an accuracy of $\pm 2$ micro-inches.
0.100 to 2.000	$\pm 2$ or $\pm 4$	Two types of calibrations are available for gage blocks in these size ranges: Type AA, for Grade AA, (laboratory quality) blocks, is indicated by the first listed accuracy at left; Type A, for Grade A (inspection quality) blocks, is indicated by the second listed accuracy.
2 to 3	$\pm 3$ or $\pm 5$	
3 to 4	$\pm 4$ or $\pm 6$	
5 to 20	1 per inch of length	Accuracy contingent on quality of gaging surfaces.

scales corresponds to half a wave-length of the light used (approximately .00001"), and it can be subdivided into tenths (approximately .000001") without difficulty. During the measurements, precise determinations are made of air temperature, barometric pressure, and humidity, since these factors affect the wave-length of light by changing the index of refraction of air. Temperature of the blocks is also measured and corrections are applied so that the final reported lengths are at the standard 68° F.

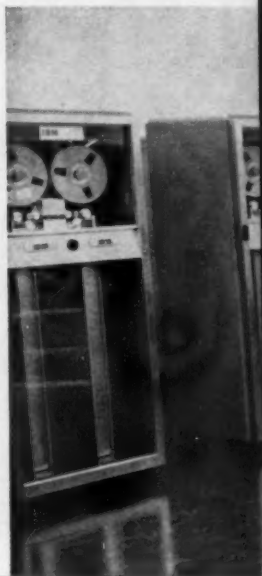
The additional data obtained from the interferometric measurements are

then fed into the computer which uses them to calculate the length of each block. It is interesting to note that from computations such as these, the accuracy of the Bureau's master gage blocks is indirectly verified. This verification is accomplished by comparing the results of the mechanical comparisons with those of the interferometric comparisons.

The final report for an "A" calibration is essentially the same except that more stringent requirements for flatness and parallelism are observed, and higher accuracies are obtained.

# If Tape Preparation Is Holding There's No Need To Postpone Numerical Control

By **James B. Pond,**  
Managing Editor



*Computer services that are available to  
industry take the headaches out of N.C.*

# You Back...

# BB



COMPUTER-ASSIST PROGRAMS greatly speed tape preparations and give optimum performance. It is in rooms such as this that most of the procedures normally followed by shop personnel are broken down into sub-routines, and this information is fed into the computers where it is stored until needed. Pictured here is one of two consoles of IBM 705 in operation at BOEING AIRPLANE COMPANY'S Wichita Division.

■ Numerical control is rapidly becoming an everyday production tool for all industry. It is tumbling costs as more and more people gain experience and can take advantage of the changes in manufacturing procedures that it is bringing about.

Those who still are apprehensive about numerical control will find that the frustrating aspects of tape preparation are being solved nicely and painlessly. Actually, there is no more reason to shy away from numerical

control than there is from cam-operated or tracer-controlled machine tools.

The screw-machine cam designer and the numerical-control parts programmer have much in common. Each must decide which tools to use, the order of operations, speeds and feeds, and other machining data.

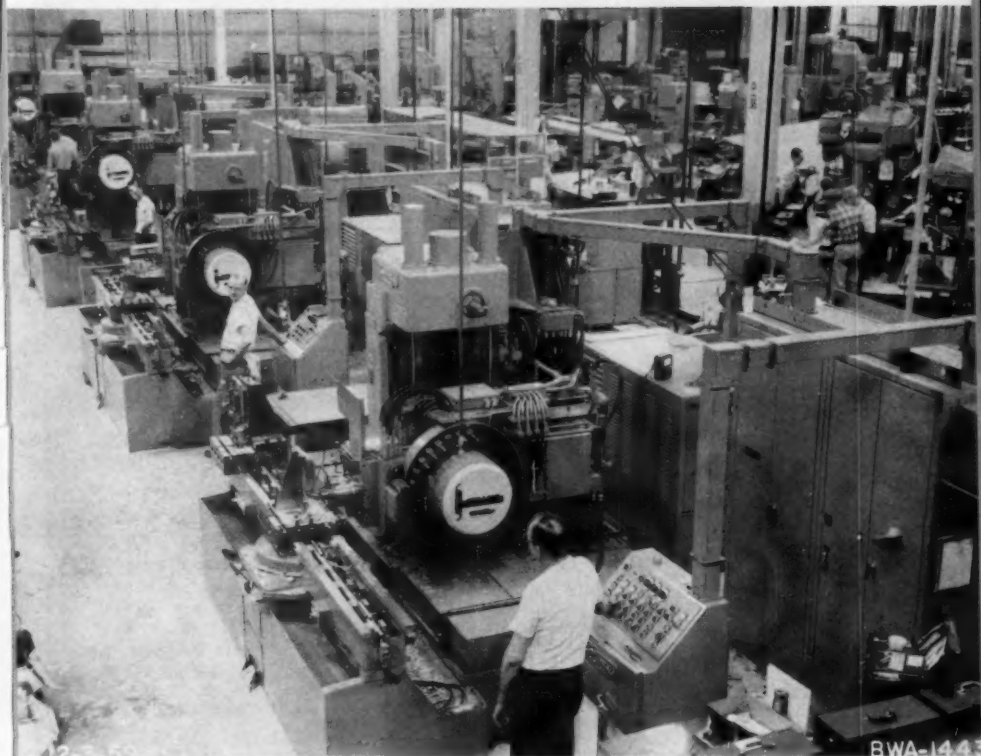
Numerical control is no more than a means of directing a machine's movements by numbers. It does involve considerable mathematics but



**TAPES PREPARED AT BOEING** are checked out in a specially built plotter-verifier that reproduces the tapes in visual form. Value of this method of checking is that the user does not have to utilize valuable machining time with a dry run to prove the tape.

operational level personnel do not get involved in higher mathematics. Tapes for point-to-point positioning systems can be prepared manually from dimensioned drawings by persons having only a high school level of mathematics. But, manual preparation of tapes is laborious and sometimes the manually prepared tape does not produce the most efficient results. Computer-assist programs greatly speed tape preparation and give optimum performance.

The reason why complicated and simple tapes can be prepared quickly by a computer is that most of the procedures normally followed by shop personnel are broken down into sub-routines, and this information is fed into the computers where it is stored until needed. Thus, if a pocket is to be milled, a programmer only has to define the periphery and then command the computer to supply the details necessary to direct the cutter back and forth to clean the pocket.



**TAPE CONTROL GALORE!** These five Milwaukee-Matics at Boeing's Wichita plant are located in a single centralized area for efficient operation. Note the ample working space around each machine in what appears to be, but is not, an aisle. This area is needed to expedite the flow of fixtures and tooling to and from the machines.

An excellent example of numerical control in action is at Boeing Airplane Co.'s Wichita plant, where there are nineteen numerically controlled machines, some simple and some complex, now working on a three-shift, six-day week basis.


Boeing's first numerically controlled machine arrived in November, 1956. It was a three-dimensional continuous-path profiling machine that required the use of a computer to prepare the system's punched tape.

By tackling the more difficult continuous-path system first, Boeing engineers found that their computer experience paid off when it became necessary to produce tapes for point-to-point positioning. They got better tapes and produced them in less time.


With the addition of other numerically controlled equipment, a variety of control systems have been involved. The problems of providing complete control media have been solved by Boeing through the development of

## EXAMPLES OF SUB-ROUTINE SOLUTIONS

TANPT



CONDITION: LINE TANGENT TO A CIRCLE  
 GIVEN: POINT ON THE LINE  
 CIRCLE CENTER  
 RADIUS OF CIRCLE  
 DIRECTION OF CUTTING  
 FIND: XYZ COORDINATES AT POINT OF TANGENCY



CONDITION: GENERAL CURVE INTERPOLATION  
 GIVEN: POINTS ON CURVE  
 TOLERANCE (CUTTER DEVIATION FROM CURVATURE)  
 FIND: XYZ COORDINATES FOR SUFFICIENT QUANTITY  
 OF POINTS TO DEFINE CURVATURE WITHIN  
 GIVEN LIMITS



CONDITION: POCKET  
 GIVEN: GEOMETRIC SHAPE (INDIVIDUAL LINES, CIRCLES, CURVES)  
 DISTANCE BETWEEN CENTER PATHS  
 FEED RATE  
 FIND: XYZ COORDINATES DESCRIBING CUTTER PATHS FOR REMOVING INTERNAL MATERIAL  
 DATA DESCRIBING FINISH CUT FOR PERIPHERY & ISLANDS WITHIN PERIPHERY

THE REASON WHY TAPES can be prepared quickly by a computer is that most procedures normally followed by shop personnel are broken down into sub-routines that are stored in the computer. In the example where it is desired to mill a pocket with an island within it is only necessary to define the geometric shapes, the distance between center paths, and the feed rate. The computer will then figure the best method to accomplish these results. The center drawing shows the roughing cuts and the drawing at the right shows the route of the cutter during the finishing cut.

computer programs. Machining information and experience have been broken down into subroutines and stored in the high-speed computers' memory devices. These programs are identified at Boeing as WALDO, short for Wichita Automatic Linear Data Output.

Of interest is the fact that Waldo's experience and tape preparation equipment are available to all industry through Boeing Applied Computer Services. These services include: parts programming, computing, tape processing, tool design, tool fabrication,

parts fabrication, consulting and training.

### Who Should Use Numerical Control?

Large plant or small, there are two conditions which indicate potential profitable use of numerical control. The two are short runs and constantly changing dimensions or designs. And, there's the rub—when runs are short and changes are constantly being made, many tapes will be required. That's why it is important to shake any lethargy one has toward the making of tapes.

## NO NEED TO POSTPONE TAPE CONTROL continued

The basic elements of numerical control include the dimensional drawing, part programming, data processing, and finally, the machine tool.

Although point-to-point positioning systems can be programmed manually at the user's plant, those who do utilize computer services such as Boeing's will find most of their activities centered around dimensional drawings and part programming, areas in which they are on familiar ground.

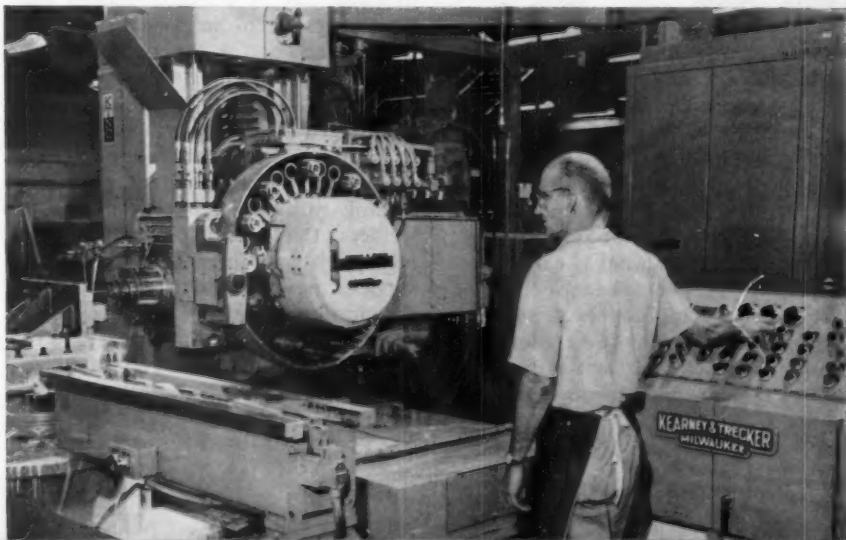
Engineering drawings are used now, but with numerical control they are not absolutely necessary. Since it is possible to work directly from formulas, prints should be completely dimensioned. Boeing programmers report that many drawings submitted to its service are not ready for production. Too much is left to the discretion of the machine operator. In this respect, airframe manufacturers are probably as guilty as the rest. They will have to change their established

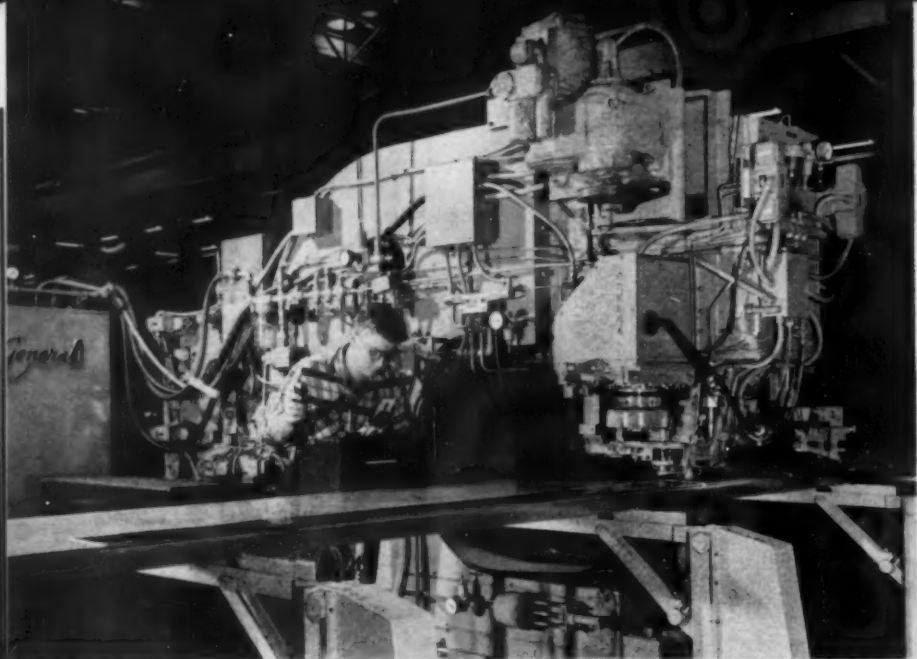
procedure of using a French curve to shape panels because a French curve can not be "dropped" into a computer. Parts must be completely defined.

The information to be taken from the dimensioned drawings or mathematical formula must be put into a language and form acceptable to the control system being employed. It is here that such vital information as the sequence of operations, speeds and feeds, direction of cutter rotation, and type of mounting of the cutter and workpiece are decided. It is interesting that production planners who do this translating do not need more than high school mathematics and practical shop experience as machine operators.

After a program sheet has been prepared, the information can go either to a card or tape punch. The punched cards or tape then may go directly to the machine control unit

**ALREADY AN OLD FAVORITE** with management and operators alike. It takes awhile to get used to seeing difficult jobs run, one after the other, without stopping the machine for lengthy changeover.





ADVANTAGES OF NUMERICAL CONTROL apply to machines other than for metal cutting. This is one of four General Riveting Co. Drivmatic riveters which rivet stringers to wing skins of the Air Force's new B-52H missile launchers. These tape controlled riveters drill, countersink and set, drive and shear the rivets.

#### NO NEED TO POSTPONE TAPE CONTROL continued

or to a general purpose computer for further refinement necessitated by the characteristics of different numerical control systems.

Some systems employ magnetic tape for continuous-path contouring, while others employ punched tape; other systems employ punched tape for point-to-point positioning. Then too, within each control system the method of application will vary from one machine tool builder to another. Such variations must be provided for, and this is done in what is called post processing. A post processor is the part of the computer program that converts raw "point data" into information acceptable to the machine control system, taking into considera-

tion the dynamics of the machine involved.

Tapes are checked out at Boeing in a specially built plotter-verifier that reproduces them in visual form. It is unnecessary for the user to place them in the machine tool and make a dry run.

Numerical control is being applied to a growing list of machines—milling machines, profilers, lathes, grinders, drilling machines, riveting machines, welders, flame-cutting machines, and inspection machines. With computer services now available for the tape preparation, the tremendous cost-saving potential of numerical control should be explored by everyone.

• • •

## Accuracy of Positioning

### Longitudinal Travel:

Greatest error in any inch .....	15 millionths
Greatest error in any 18 inches .....	35 millionths

### Cross Travel:

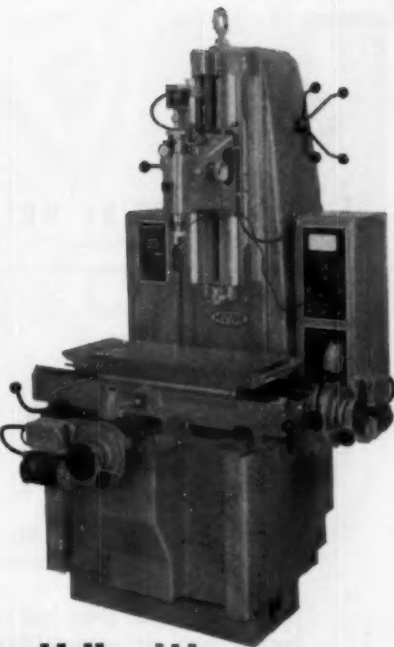
Greatest error in any inch .....	15 millionths
Greatest error in 11 inches .....	35 millionths

### Squareness:

Compound slide .....	20 millionths
Travel, spindle housing .....	50 millionths in 17"
Travel, spindle .....	30 millionths in 2¼"

### Spindle Axis:

Runs true .....	within 3 millionths
-----------------	---------------------



# These users measure to one-third of a "tenth" with Moore Universal Measuring Machine

The tolerances shown at the top of this page will be proven in front of you before final acceptance of the machine, as it was with each customer shown at right.

These users will also attest to the advantages of this machine: its capacity for ultra-precise measuring and inspecting of larger workpieces; the choice of an electronic indicator supported on an accurate, rotatable spindle, or a universal microscope for pickup; a combination of rectilinear and angular positioning, making possible the measurement of the most complex contours. All ways are hardened, ground and lapped steel, fitted to hand-scraped cast iron. Table positioning in two directions of travel is by means of master lead screws. Note motorized lead screw drive, offered as optional equipment.

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125

## Increasing a Press's Capacity

By L. Kasper

■ Once in a while a machine isn't quite big enough for a job. Such was the case recently in our plant when the only machine available for a riveting operation was a small punch press. The press had sufficient power and shut height but its short stroke would not permit the workpiece to be inserted between rivet sets. The die shown on the opposite page was designed to increase this opening between the rivet sets when the ram was in its upper position.

The die is shown in Figure 1 in the open position. The workpiece is in position but it is mounted in a fixture that is not illustrated. Figure 2 shows the die in the closed position with the rivet set.

Here's how it works: The two rivet sets **A** are mounted on levers **B** and **C**. Lever **B** swivels on a pin mounted in block **D**, which is attached to block **F** mounted on the bolster plate. Lever **C** swivels on a pin mounted on the two extensions on lever **B**. Two links **G** connect lever **B** with the block **H** mounted on the ram of the press. Block **F** carries a roller **E** which supports lever **C**.

After the workpiece has been inserted, the press is tripped, causing the end of lever **C** to swing upward by the downward movement of lever **B**, to the position shown in Figure 2, setting the rivet. The lever arrangement provides an opening for the insertion of the workpiece approximately equal to four times the stroke of the press.

• • •

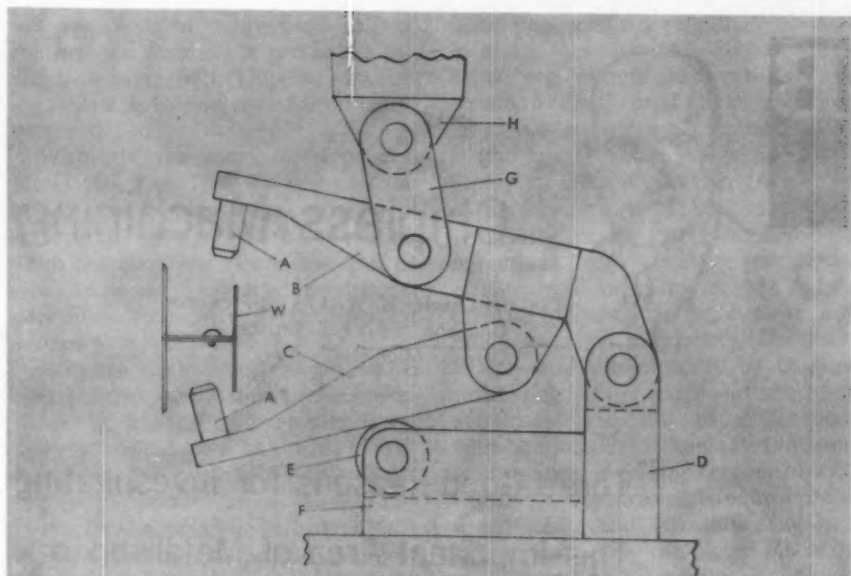


FIGURE 1

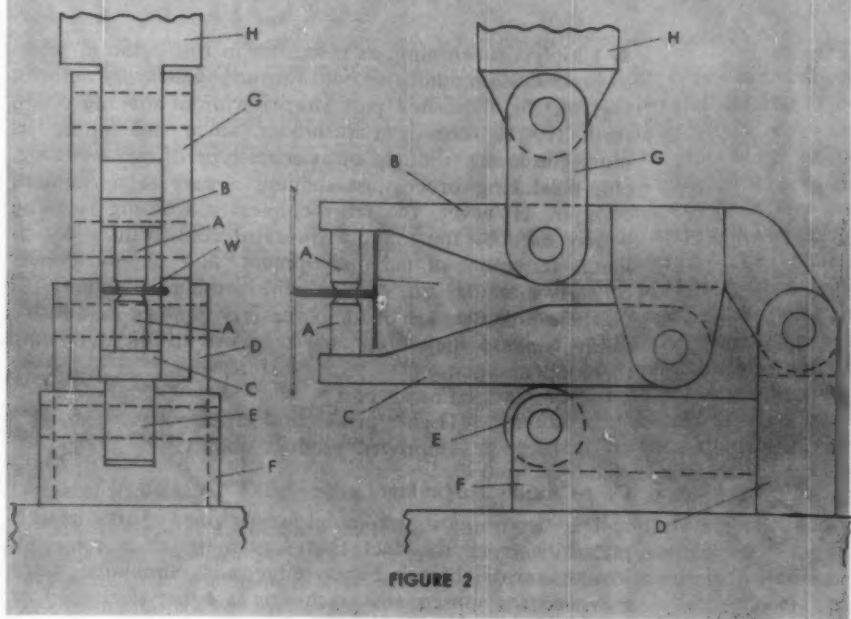


FIGURE 2



## Chipless Machining

By **Charles H. Wick**, Vice-President  
Dudgeon, Taylor & Bruske, Inc.  
Detroit, Michigan

### Three Good Reasons for Investigating This Important Area of Metalworking

■ Chipless machining, as discussed in this column, refers to production methods of cold forming (plastically deforming) metal to finished part shapes without making chips. Actually, the term is a misnomer, since "machining" is more commonly thought of as some type of metal-cutting, chip-producing process of shaping a part to a required contour. However, the term chipless machining is being widely used by the manufacturers of cold-forming equipment, the users of such equipment, and the purchasers of parts made by the various cold-forming processes.

These processes are being increasingly applied in industry today because they offer one or more of the following three advantages:

1. Lower cost.
2. Higher production efficiency.
3. Improved product quality.

#### **Cost-Cutting Advantages**

The lower cost of chipless-machined parts results primarily from the fact that less material is required. Production of chips is either reduced or eliminated, since the need for subsequent machining is either decreased or

not required. In many cases, all of the original material is present in the finished part. With chipless machining, metal is moved rather than being removed.

Waste in the form of chips can be as much as 70% or more in the production of some metal parts, with an average of about 30% by weight. With the continual rise in the cost of raw materials, chipless production processes thus offer an important economy.

Another cost-cutting advantage is that cheaper raw materials can sometimes be used. For example, lower cost, hot-rolled steel bar stock is now being used for many cold-formed parts previously made from cold-drawn bars. This is possible because of the higher physical properties resulting from the plastic deformation of the material, and the unbroken, contoured flow-lines produced. In some instances, the need for previously required hardening of the parts has been eliminated. In other cases, the cross-sectional area of the part can be reduced because of increased strength.

Further savings are frequently obtained as the result of lower labor costs, since many of the cold-forming processes can be made completely automatic. Also, the investment necessary in capital equipment is generally less, because fewer machines are usually required. Tooling costs, too, are sometimes less, especially when large quantities of parts are needed.

### **Higher Production Efficiencies**

Many chipless machining methods permit high rates of production. For example, in cold extruding small steel components, 100 or more parts are

being produced per minute. With cold heading, outputs of 450 or more parts per minute are possible. In thread rolling, production rates of 2000 per minute are common. Such high rates result in economical, highly efficient production and assure a rapid return on capital investment.

Versatility of the processes and equipment also boosts production efficiency. Unusually shaped parts, difficult or costly to produce in any other way, can frequently be made rapidly and economically by chipless machining. Many parts and processes are easily adaptable to automation, with automatic loading, cycling, unloading, and handling between operations. Parts previously requiring the manufacture and assembly of several components can often be made in one piece, thus greatly facilitating production.

### **Improved Product Quality**

The high quality of parts produced is an important benefit derived from chipless machining methods. Since the raw material does not have to be heated, as in casting and forging, there is no scale formed on the surfaces of the parts, and no decarburization of the material. The smooth surface finishes produced, with well-rounded corners and fillets, and no burrs—as well as the close tolerances that can be maintained—generally eliminate the need for any subsequent machining of the cold formed parts.

Consistent uniformity of the parts produced is also important, since it eliminates the need for 100% inspection and assures customer satisfaction. Another factor contributing to improved product quality is the increased strength (tensile, yield, shear, and

fatigue) and higher hardness resulting from cold working.

### **Limitations of Chipless Machining**

While fewer machines are generally necessary for cold forming, the cost of the machines are usually quite high. Also, tooling for the equipment can be expensive unless it is amortized over large production requirements. As a result, many chipless machining methods are not economical for short runs of a large variety of parts.

The size of the parts that can be produced by chipless machining methods is limited because of the large, expensive equipment required to produce the necessary high pressures. Also, some of the higher alloy steels and the newer superalloys cannot be cold formed because of the high pressures required.

However, continued progress in improved equipment, tooling, lubricants, and techniques will remove these obstacles. In fact, most of the limitations mentioned do not pertain

to explosive and high-energy-rate forming methods which will be discussed in subsequent columns.

### **The Future of Chipless Machining**

Cold forming methods of producing metal parts are, with few exceptions, not new. However, they are only now beginning to grow in popularity and be increasingly applied in all metal-working industries. Automotive, aircraft, and other industries are devoting considerable time and money to the development of such processes and their application to the manufacture of their products.

Continued growth in the application of chipless manufacturing processes will require an entirely new concept on the part of management, designers, and production engineers. They should no longer ask, "What machines can we produce the parts on?" Instead, they should think in terms of processes, and be familiar enough with chipless machining methods to consider them for their production requirements. The ideal time to consider any process is in the product design stage, when minor modifications might mean major savings.

Chipless machining undoubtedly has a bright future. Larger machines, better tooling, more suitable lubricants, and improved techniques are continually being developed. "Warm-forming"—the plastic deformation of metals heated to below their transformation temperatures; huge power-spinning machines for missile airframes; and new high-energy-rate forming methods are some of the important developments that will be discussed in future columns. • • •





## *The Practical Diemaker*

By **Paul Prikos**  
Prikos & Becker Tool Co.  
Skokie, Illinois

Want quality production?

## Check Your Attitude Toward Maintenance

■ Today's emphasis is definitely on quality and excellence in manufacturing. It is folly to expect to attain these high demands without topnotch equipment. Since few can afford to purchase new or nearly new machinery every year, good maintenance schedules should be followed to at least sustain the specified performance of the machines during their depreciation period.

Though most large companies have established a maintenance setup that blankets all physical assets of the factory, a little extra effort in most cases would see improved results. Small companies, where there is a more personal interest by owners, have an advantage, they can keep a closer scrutiny on the upkeep of equipment.

The die room or die shop of any captive or job shop must be considered as small scale companies; they should have scheduled maintenance procedures with periodic checks by interested personnel to maintain top efficiency.

A suggested maintenance procedure for die room equipment could be as follows:

**1. SURFACE GRINDERS**

(light type)

Every week or two, depending upon their usage, turn the tables over and thoroughly clean out their ways. Check for score marks and for foreign particles that may be embedded in the ways. Freshly oil the way and clean the machine thoroughly. Test dust collector, and observe for excess slack in all lead screws and downfeed screws.

**2. SURFACE GRINDERS (heavy duty-hydraulic)**

Clean thoroughly without dismantling. Make certain oil is reaching all recommended spots. Check for leaks in the hydraulic line and test for excess slack in all lead screws and downfeed screws. Any grinding coolant should be replaced and the pump checked to see if it is functioning properly.

**3. JIG BORERS and JIG GRINDERS**

These machines should be in tiptop shape and it is advisable for the respective operators to thoroughly maintain their machines according to the manufacturer's directions.

**4. LATHES**

Weekly clean them down with commercial solvents or kerosene. Ways should be checked for nicks and damage. All oil points must be filled and the machine greased wherever necessary. Check the tool saddle and compound for wear because most wear is usually found at this place in the lathe.

**5. MILLS and SHAPERS**

Same maintenance as the lathes.

**6. DRILL PRESSES**

Check all belts and spindles for wear and be certain table is perpendicular to spindle. Drill chuck should be checked out for excessive wear and drill press vises checked for damage.

**7. TRYOUT PUNCH PRESSES**

Properly grease and oil. Clean out any slugs caught in bolster and other depressions about the press. Check all safety devices so they function as required.

**8. INSPECTION EQUIPMENT**

Micrometers, indicators and surface plates require double checking against the master gages.

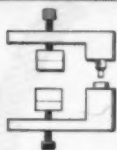
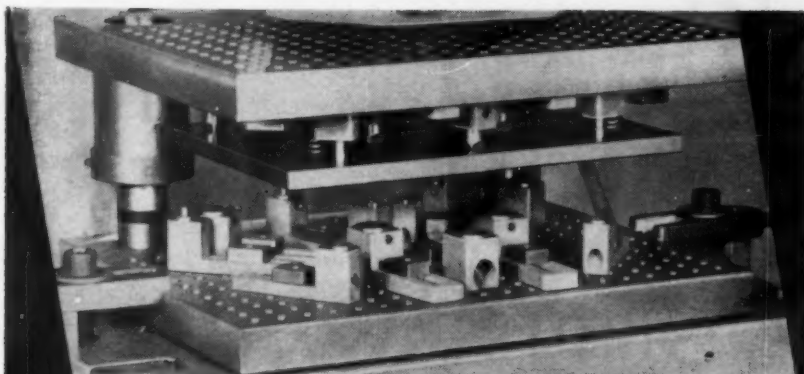
**Preventive Maintenance Keeps Costs Low**

If the above conditions are met, I am certain that heavy maintenance bills could be avoided. Die makers and machine operators will work with complete confidence when they realize the equipment is safe and reliable. Failure and impending breakdown of equipment can, in this way, be detected in advance and preparations made to correct any malfunctions.

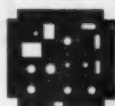
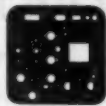
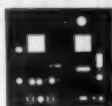
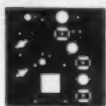
Try also to encourage all employees to report any damage or improper machine performance to the foreman so that on the spot maintenance can be done without having the machine stand idle for the long periods of time needed for major overhauls.

In our plant, we usually make our own minor machine corrections. However, when major maintenance is required we usually have a qualified machinery rebuilder or original equipment serviceman repair the machine.

• • •



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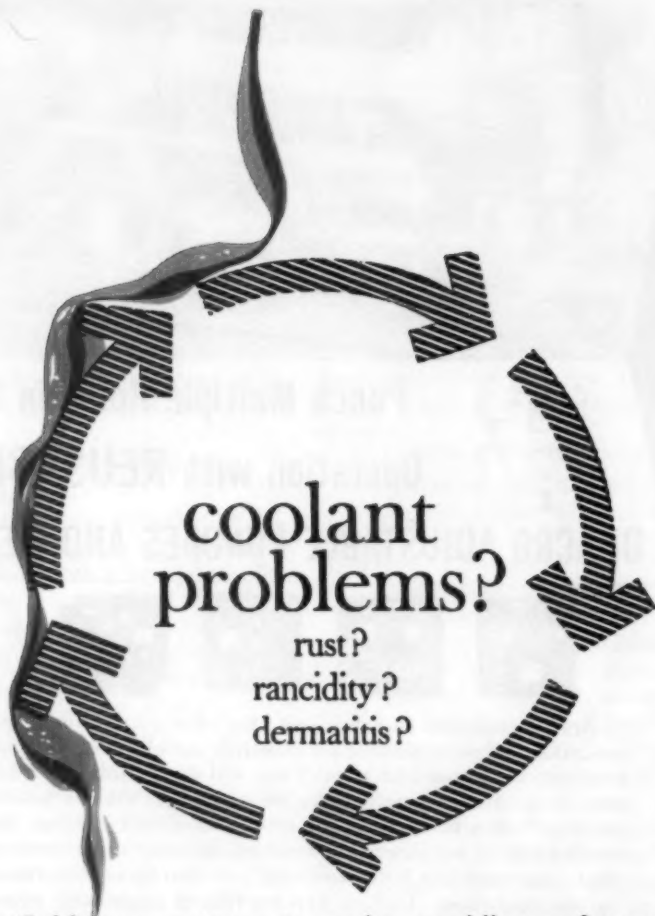
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## Cutting Tools



By **Ray W. Ruckel**, President  
Wesson Company

# Now Finish Milling With Throw-Aways!

■ About five years ago we completed a rather extensive survey to see what industry thought about throw-away carbide inserts for milling. As might be expected, we found a great deal of interest and some throw-away cutters being used. The applications were all in roughing operations, but the interest was equally high for roughing and finishing.

Within five or six years, the composite survey opinion indicated, the percentage of milling operations done with throw-aways could well be higher than for any other type of operation—including turning, boring and facing. Obviously, the potential savings with throw-aways—eliminating regrinding, reducing set-up time, etc.—would be higher per tool for multiple-point tools such as milling cutters than for single-point tools.

As we all know, the rush to throw-aways for milling cutters didn't live up to industry's own expectations. While there has been a steady, but slow, rise in the number of rough-milling cuts taken with throw-aways, finish milling with these new cutters had run up against a stone wall.

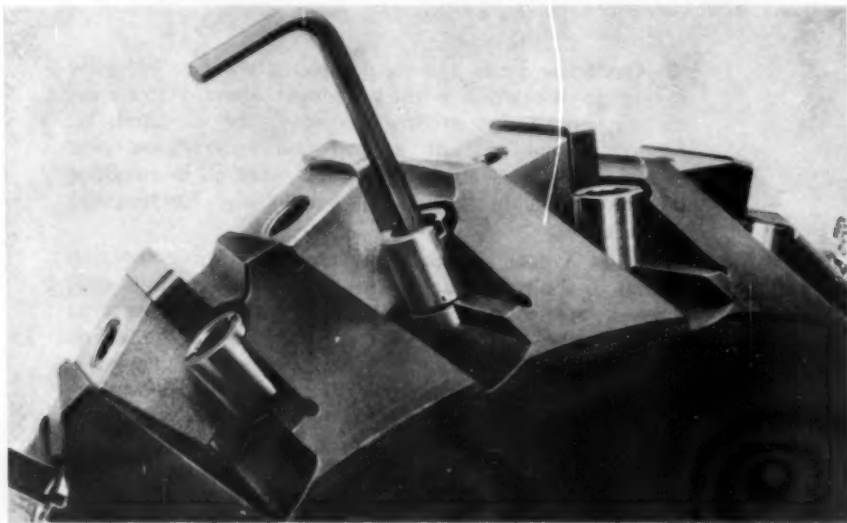
***Adjustable feature in milling cutter bodies permits use of throw-aways for finishing cuts***

Throw-away cutters just didn't do the job. Further, many plants—disenchanted with throw-aways for finishing—did not adopt them for roughing because they didn't want two different cutter systems and the headaches such a double standard implied. So the cutter industry, including ourselves, continued to sell more conventional cutters than throw-aways.

In a nutshell, the problem was variable run-out from insert to insert. For roughing, the run-out wouldn't

bother anybody. For finishing, it did.

In trying to solve the problem, cutter manufacturers concentrated their early efforts on greater precision in cutter bodies. Progress with this approach stopped when cutters with practically zero run-out in their bodies still had too much insert variation because of the tolerances on commercially ground inserts. Special grinding of inserts would have been a step backwards, economically, so greater precision of components was cancelled out as a possible solution.



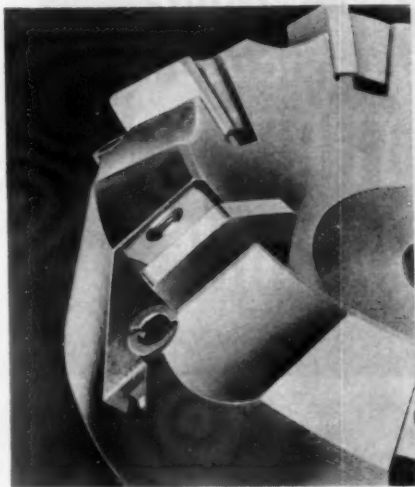
1. Cam-shaped pin permits individual axial adjustment for throw-away inserts so cutter run-out can be reduced to tenths. Insert bears against cam section, which can be turned and tightened to position the insert accurately anywhere within a 0.030" range.

The first big step in getting the answer was, as so often happens, a simple one. Since variation of individual inserts was the problem, ability to adjust individual inserts was the solution to finish milling with throw-aways. This obvious answer probably was overlooked because nobody wanted to add a lot of adjustment "machinery" to a tool having a simple, clean design.

A practical answer to this came from work being done on boring bars to make them micro-adjustable. In a new design of milling cutters, the traditional fixed-pin used to support an insert is replaced by one with a straight-sided constant-rise-cam section for adjusting, Figure 1. With this arrangement, it is possible to adjust each insert to close limits within an axial range of 0.030". Cutters with over-all run-out in tenths are now feasible and finish milling can be done with commercially ground throw-away inserts.

With a normal amount of care in setting up, such cutters now produce with ease surface finishes of from 60 to 100 microinches—limits which cover the bulk of production-type finish-milling operations. To obtain finer surfaces, greater care is simply exercised in setting up the cutter. This takes time but, since it would be done off the machine, downtime would not be increased.

Admittedly, surface finish is a difficult specification to pin down. At the finer end of the scale, you can't be sure what you are measuring. In many instances, one ends up measuring porosity rather than surface finish. We ourselves have had field reports of production surfaces that



2. By replacing one standard insert in a cam-pin cutter with a micro-finishing blade, surface finish can be improved consistently. The special blade has a wiping action to remove cutter feed marks.

consistently measure at 3 microinches but we feel this is a happy accident rather than something to be expected.

Another recent development has, however, lowered the practical surface-finish limits that can be specified and met. By replacing one of the inserts on one of these newer throw-away cutters with a "micro-finishing" blade, Figure 2, cutter marks can be practically eliminated. This blade has a wiping action and, therefore, also permits a higher feed rate on some jobs.

There was still another problem in milling with throw-aways—the restriction on the number of teeth that could be packed into a cutter. Good design, however, has reduced this limitation to the point where cutters

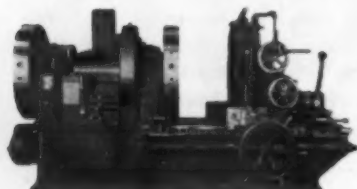
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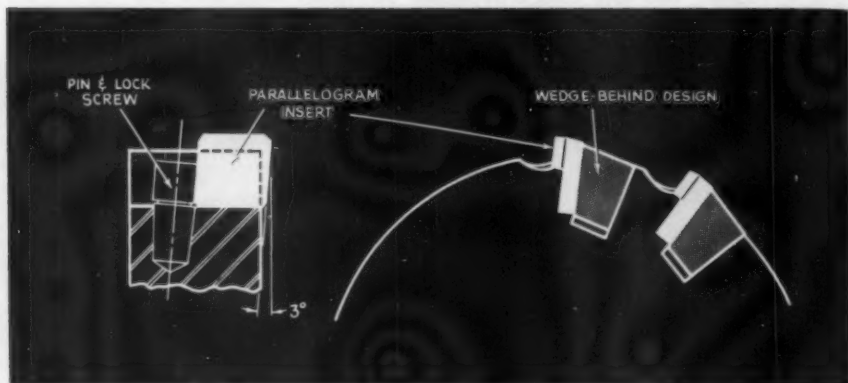
with three inserts per inch of diameter are common. We even have some experimental cutters with up to six inserts per inch of diameter, and successful tests with these point toward comparable commercial cutters in the not-too-distant future.

Because many of the major disadvantages of finish milling with throw-aways have vanished is no indication that design has reached the ultimate. In fact, as more throw-away cutters are applied in milling, new and unknown problems will arise.

For example, locating slots on forged crankshafts have been milled with half-side-milling cutters using brazed, inserted blades. Production results were satisfactory but grinding costs were high and many blades broke in use. The answer to this proved to be a special parallelogram

type of throw-away insert, Figure 3. With this, grinding costs dropped to zero, breakage was drastically reduced and production per cutter doubled. Without even considering the savings from fewer and shorter downtime periods for tool changing and adjustment, production savings for one year are one and one-half times as large as the cost of the new cutters.

It is quite possible that the switch to milling with throw-aways may rapidly accelerate now that finishing operations as well as roughing can be successfully converted to throw-aways. Although throw-aways will not necessarily offer the most practical or most economical answer to all production-milling problems, they should always be considered since they inherently offer a chance for large production savings. • • •



3. Special parallelogram throw-away inserts in a half-side-milling cutter have only four cutting edges but, in a special milling operation, dramatically reduce production costs while increasing consistency of results.

## Field Reports

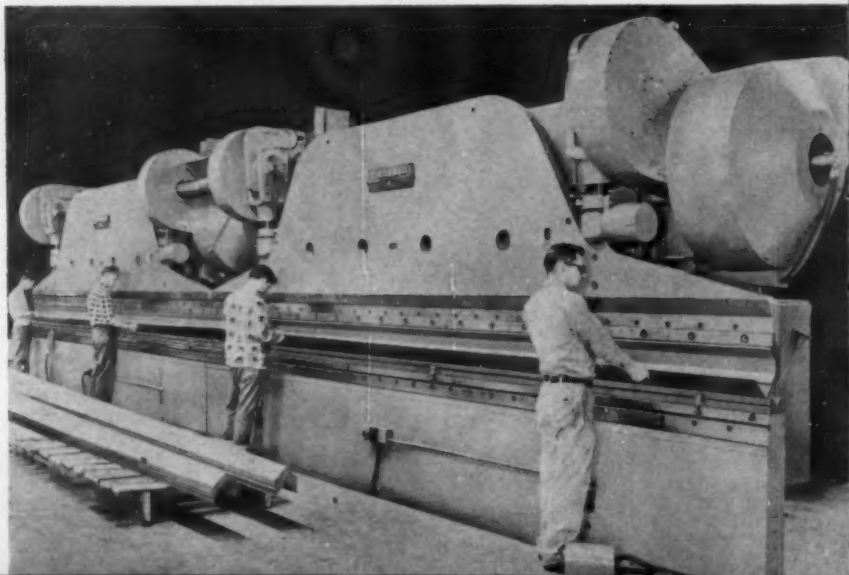
### LIGHT POLES MADE ON TWIN PRESS BRAKES

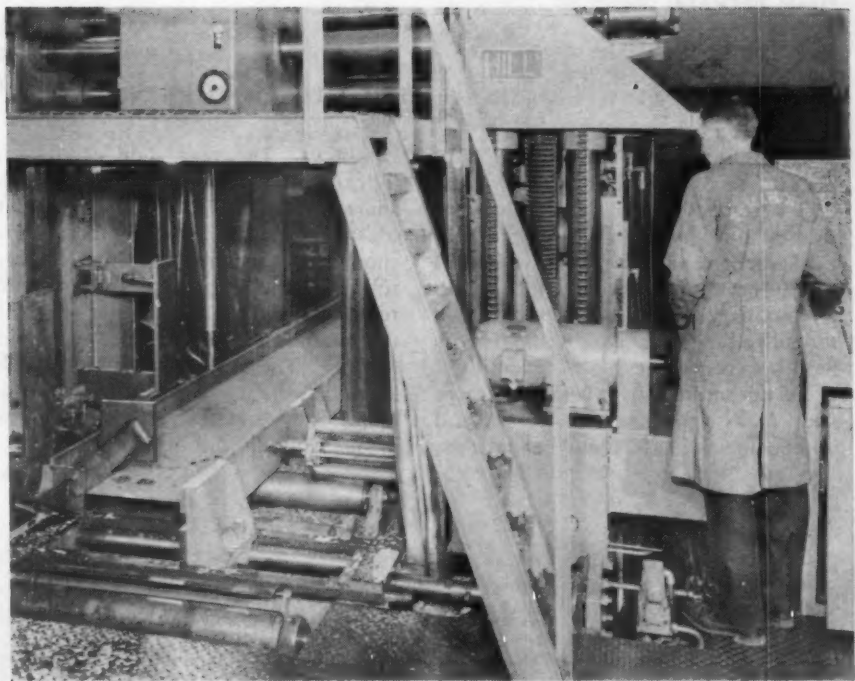
■ Tying two new press brakes together in tandem has opened up brand new markets for Whiteway Mfg. Co., Cincinnati, outdoor lighting equipment manufacturer. Previously, the company specialized in lighting systems for service stations. The new equipment permits production of light poles up to 40' long for streets, drive-ins, ball parks, and shopping centers.

Cycling is automatic, once the operator presses a button or engages a treadle. The ram runs down in high speed until just above the work, then automatically shifts into low speed through the bend. When the bend is completed, the ram returns in high speed.

Both Cincinnati brakes operate either as one unit or individually. Each brake has a rating of 150 tons mid-stroke and 225 tons bottom-stroke; distance between housings, 12½'; bed and ram extensions, 36" each and; total die length, 20'; and throat, 18".

• • •





## TAPES MAKE DEBUT AT STEEL FABRICATOR'S

■ A Hill numerically controlled beam and column drilling machine installed at R. C. Mahon's Structural Div., Detroit, is said to be the first of its kind in the structural-steel fabricating industry. In its initial application, it is cutting the cost of hole patterns by more than 85% over previous layout, spacer-punching, reaming, and radial-drilling procedures. Patterns are so accurate that bridge reaming on the assembly floor is virtually eliminated.

Basically, the equipment consists of motorized run-in, beam-feed, and run-out conveyors; and a high-speed drill having two opposed horizontal spindles

and one vertical spindle. One operator controls the entire unit. It can drill  $\frac{3}{4}$ " holes in steel at feeds up to 30 ipm.

Pushing the cycle start button actuates a tape reader in the control console, and it reads the first block of information on the tape. The machine immediately moves to the command locations, with all motions moving simultaneously. When the beam is in position, part clamps operate. Then, as soon as one of the drills begins to run, the next block of information on the tape is read and stored.

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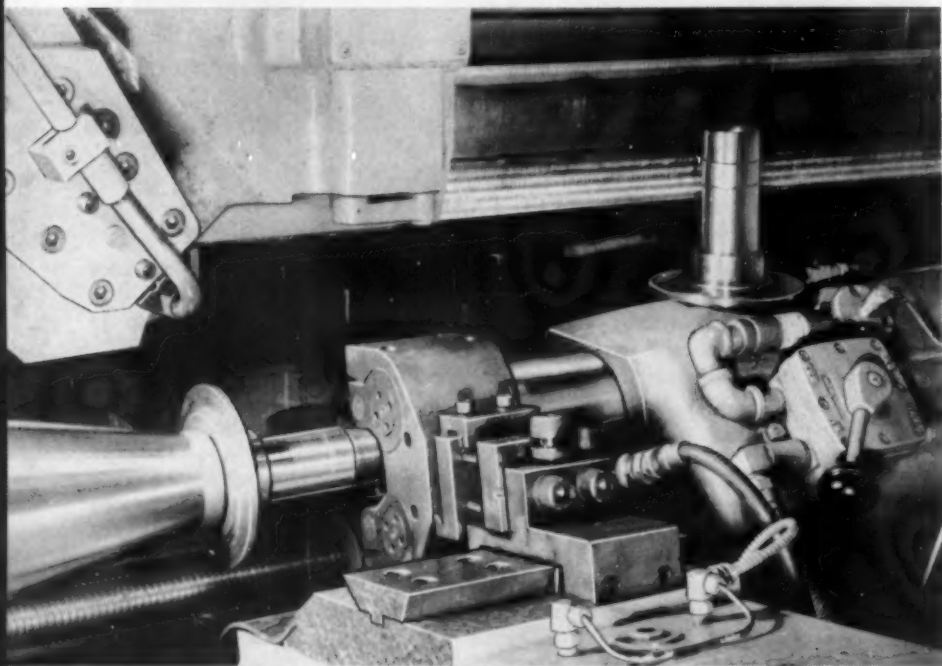
## THREAD ROLLING COMBINED WITH TRACER TURNING

■ An automotive component plant rolls the thread on front wheel spindles in the same setup in which the outside of the work is being contoured. Equipment is a Seneca Falls Model LQ automatic tracer lathe fitted with an auxiliary front slide and a Reed thread-rolling attachment. Work is held between centers.

In operation, an overhead tracer slide feeds toward the tailstock, and a rear facing slide feeds toward the

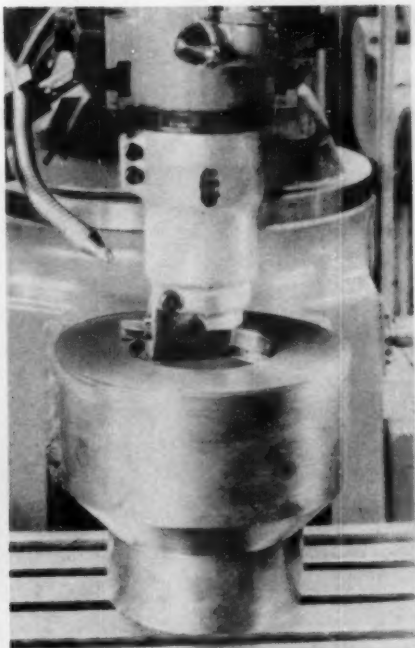
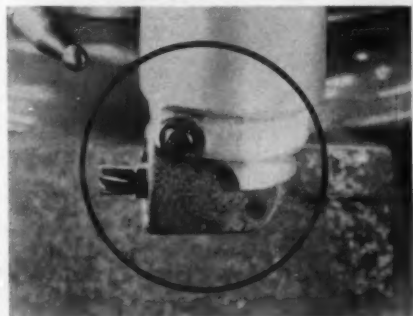
headstock. The rear slide carries an indexing tool block which presents a sharp cutting tool for a qualifying cut of the diameter to be threaded, on a short-length second pass. Immediately following the second pass, the thread rolls advance to the center line of the work and then retract in rapid traverse. The front cross slide, which supports the thread rolling attachment, is operated by a barrel type cam revolving through 360°.

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### RIGHT-ANGLE DRIVE MILLS KEYWAYS

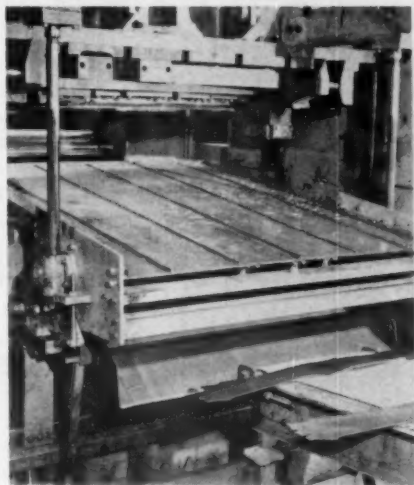
■ Modern Machine Shop, San Francisco, cuts keyways in hard-to-reach sheave bores on a vertical milling machine equipped with an ABL angle drive. The shank of a  $\frac{1}{2}$ " end mill, used to produce the  $\frac{7}{8}$ " by  $\frac{5}{16}$ " keyways, was ground and fitted to the angle drive, which in turn was fitted to the milling machine with a company-designed adapter. • • •



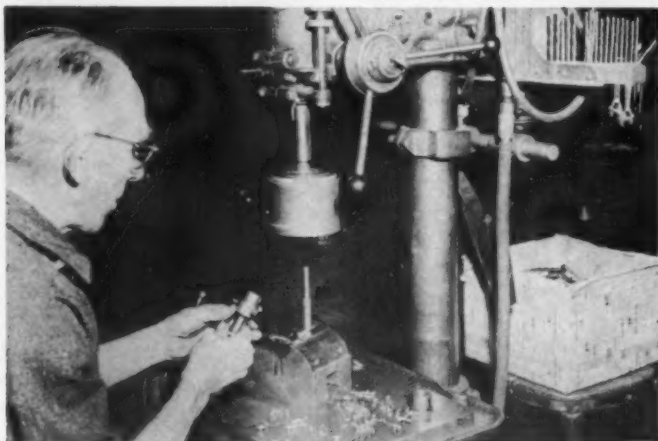
### UNLOADER TIED TO PRESS RAM

■ The removal of blanks with a Lahr part unloader is appreciably increasing output of stampings on this 400-ton press, at Chrysler's Mack Avenue Stamping Plant, Detroit. The unloader accommodates four blanking dies of varying width, with a minimum of change-over time. Blanks are delivered to a moving conveyor which discharges them into the storage bin. Scrap is shed on a chute under and through the unloader to a conveyor which carries it to the scrap bin.

Power for operating the unloader is supplied from the press ram which drives twin vertical racks moving the tray in and out of the die area. • • •



## **DRILL PRESS WITH HOLLOW MILL PROVES FASTER THAN LATHE**



Titan Tool Company, Fairview, Pa., turns cold rolled steel faster and at lower cost by using a hollow mill in a standard 17" Delta drill press for work formerly done on a lathe. The work piece, a hand tool to be fitted with a plastic grip, is machined to  $\frac{3}{4}$ " diameter a distance of 2".

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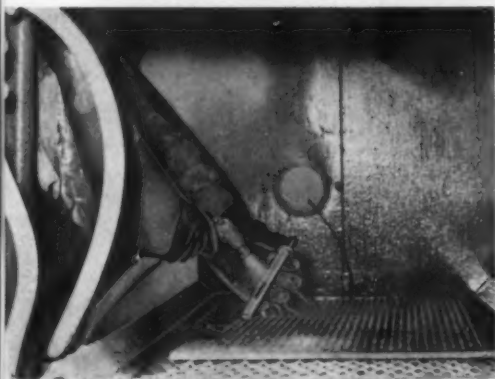
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## **TOOL BEAUTY SALON**

■ In a Liquamatte wet blasting cabinet installed at Micromatic Hone Corp., Detroit, the company's line of honing tools is given a satiny, clean, and uniform surface. The method utilizes an abrasive slurry thrown from lightweight guns.

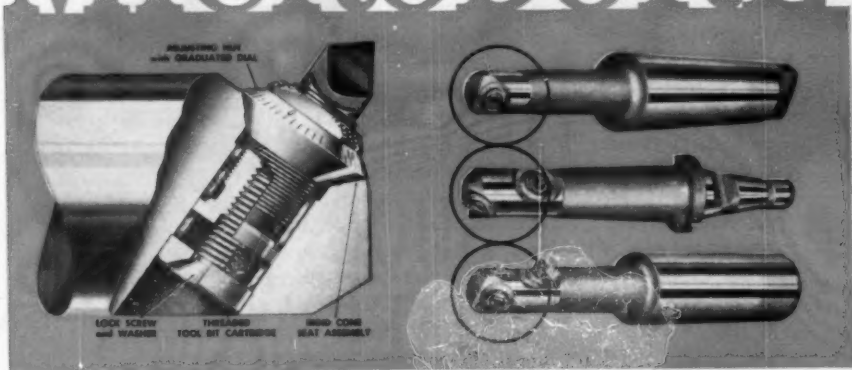
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**KENNEDY SPEAKS OUT  
FOR MODERNIZATION**  
—see page 164



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## Shop Hints

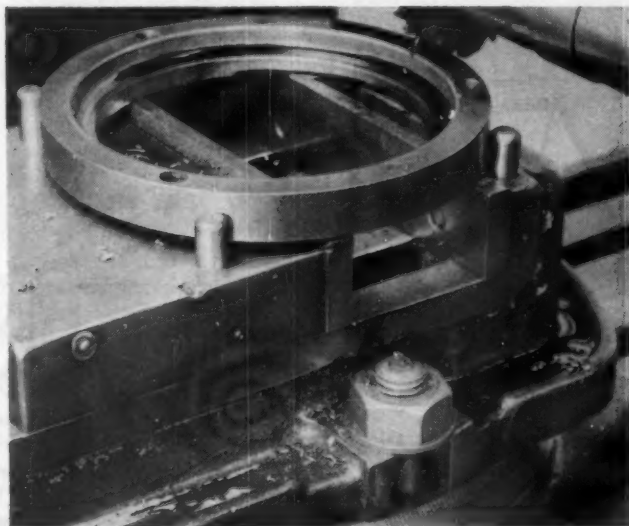
### MODIFIED VISE HOLDS CIRCULAR WORK

By **H. J. Gerber**

■ A simple adaptation to a milling machine vise broadens its capacity and permits many jobs, such as the circular workpiece shown here, to be safely held.

The sliding jaw block and the vise body have been drilled and reamed to receive four  $\frac{3}{8}$ " dowel pins. The work is placed on the top surface of the vise jaws and is gripped by these pins.

After reaming the holes for the pins, I lapped them so the hardened and ground dowels would slip into place and could be easily removed. Small air release holes were drilled into the side of the vise to the dowel holes to assure bottoming of the pins. • • •



## SMALL SPRING SPEEDS PIN GRINDING

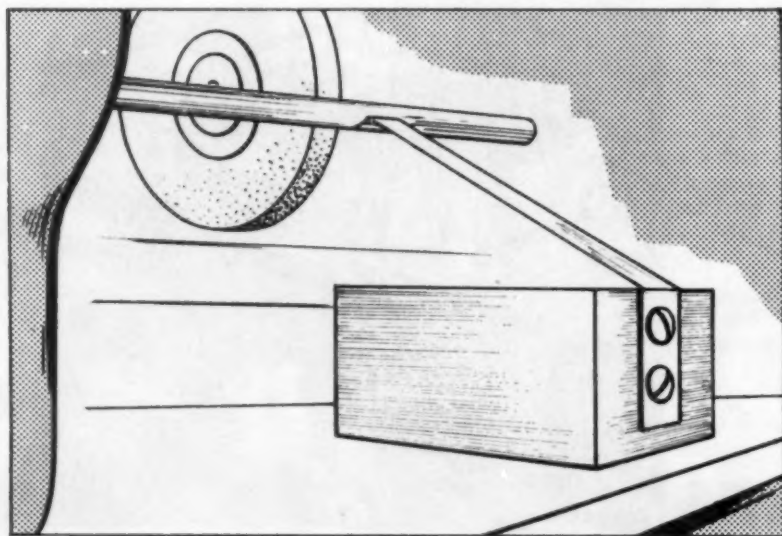
By Frederick King

■ In my work as a diemaker I often have occasion to grind pins of small diameter that extend beyond the recommended distance from a collet. Vibration of the pins often causes chatter marks and breakage, or does not give equal diameters for the length of the pin being ground.

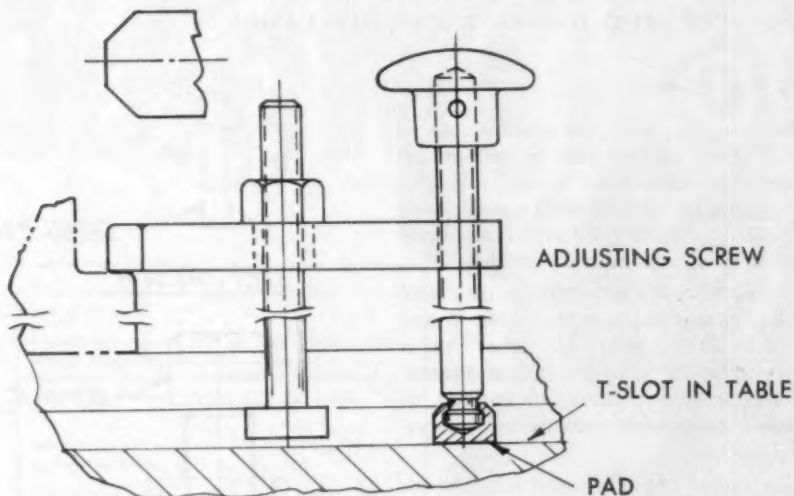
I made up a tool to reduce this chatter and it has worked very well, both for my co-workers and myself. It is merely a block of steel with a flat surface and a spring of light springy metal such as beryllium copper. The spring is made from  $\frac{1}{2}$ " wide, .008"

thick stock approximately 5" long. It is secured to the block by two round head screws.

The spring is bent enough so that when released it just touches the pin to be ground. The pressure is probably less than an ounce. A small groove is put in the end of the spring to keep it from shifting. When checking the diameter with a micrometer, the spring is depressed and need not be removed until the job is finished. Another advantage, the depth of grind can be greatly increased with a subsequent saving in time. • • •



## RAPID SETTING T-SLOT CLAMP SPEEDS PRODUCTION



By M. W. Loftus

■ In our shop we have many short run jobs that are strapped with general-use clamping equipment. Set-up and clamping time, which is high for this type of work, has been reduced considerably by adopting the clamps shown here. Several sizes of the clamp have been made up for our tool crib

inventory. We use  $\frac{3}{4}$ " bolts in  $1\frac{1}{16}$ " T-slots by putting two small flats on the bolts for clearance. The handknob on the adjusting screw makes it easy to set the height of the clamp and to apply pressure. A slot permits the clamp to slide out of the way when removing the work. • • •

## ADHESIVE EXTENDS DIE LIFE

■ Bonding neoprene strips to the base plates of steel-rule dies at Templet Industries, Inc., Brooklyn, N.Y. The strips, which serve as ejector "springs" to release parts and scrap, are bonded to both metal and wooden base plates. Adhesive (Eastman 910) is a high-strength, quick-setting material, able to withstand the repeated compression resulting from long-run stamping. Only a small quantity of the clean, easy-to-apply material is needed. • • •



## POSITIVE STUD DRIVER BACKS OFF EASILY

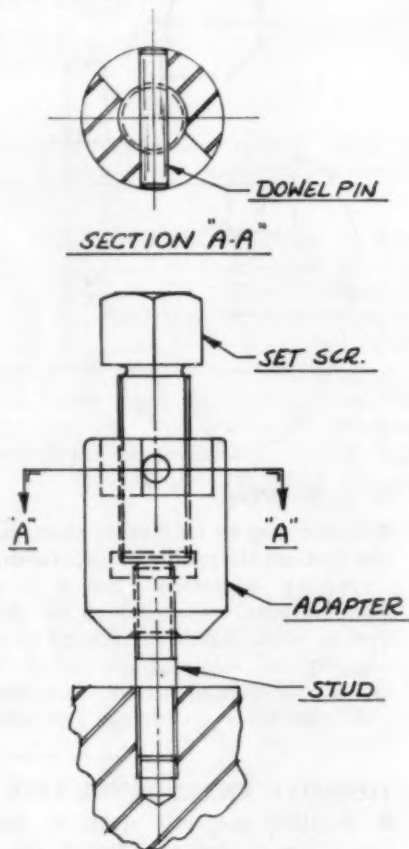
By Roger Isetts

■ The positive automatic-releasing stud driver shown here is simple and very inexpensive to make, yet it is rigid enough to withstand considerable abuse. It can be used either manually or with a pneumatic wrench.

Basically, the unit consists of a steel adapter that has a tapped hole in one end to fit the stud. The other end is tapped to fit a coarse-thread square-head set-screw. Slots are milled as shown to provide locking and releasing action.

A dowel pin is pressed into the set screw and as the stud is being driven in, the pin contacts one side of the slot. When reversing, the coarser thread on the set screw quickly backs off until the pin contacts the edge of the slot on the other side. This relieves the jamming effect of the set screw and the stud, and the driver backs-off easily. Since the set screw is already case hardened to about 50 Rc, it can be used as is and it is only necessary to grind off a small portion to get below the hardened surface in order to ream a hole for the pin.

• • •



## REPACK BEARINGS WITH CLEAN GREASE

By George F. Burnley

■ When cleaning ball bearings while overhauling equipment, repacking the bearings often involves waste and exposes the bearings to possible con-

tamination from minute specks of dirt.

To cope with the situation, I use a plastic bag, fill it with grease, drop the bearing in, knead the bag to work the grease into the bearing, and then retrieve the bearing with a wire hook.

• • •

# BORING CRITERION

Criterion makes 26 different models with a boring range of  $\frac{1}{8}$ " to 20".

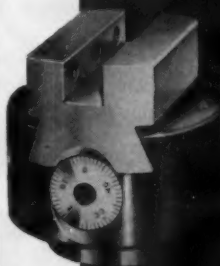
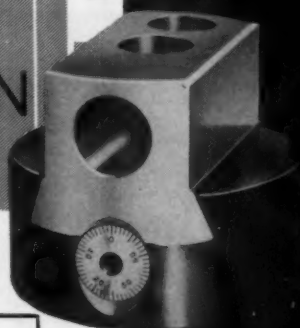
Among those available, you may select tenth-setting heads for extremely close work, square and slotted bar holder heads for special application, and a variety of hole sizes from  $\frac{1}{8}$ " to  $1\frac{1}{2}$ ".

Whatever your requirements, there is a Criterion Boring Head that will do your job.

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For more information on Criterion Tool Products, write for free literature or consult the dealer in your area.



# HEADS

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## **MAGNETIC BASE STOP FITS MANY JOBS**

By **Norm Fried**

■ Much of our experimental work is of the short run variety, calling for repetition setups. To avoid fixturing where it is not economical, a milling stop is useful. This enables a reference surface or dimension to be located or produced on part after part. We have several commercial units in the shop, but when they are not available, the device shown has proven very useful.

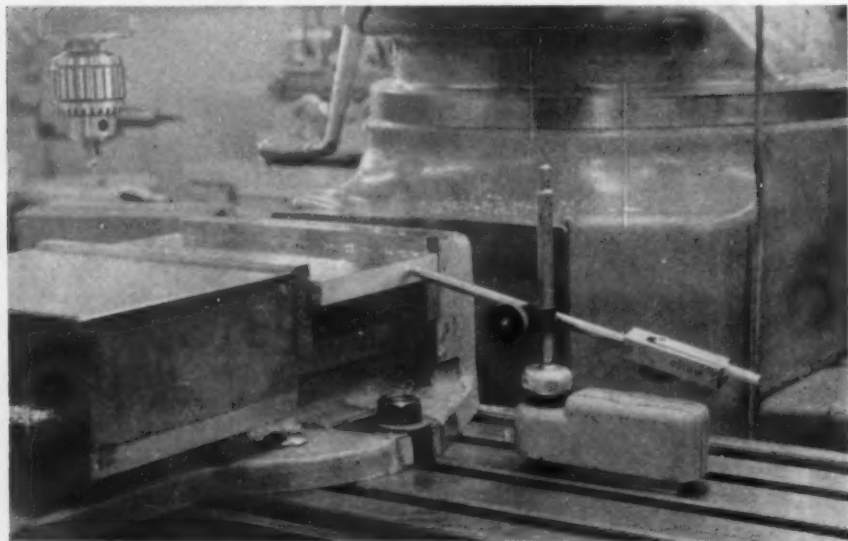
A standard magnetic base is used, the heavy-duty magnet type being preferred. Place the magnetic base on the machine's table as close to the work as is possible. Tighten the base's

spindle collar for the greatest rigidity, and bring the ball end of the indicator rod arm into contact with the workpiece reference surface. Tighten the spindle arm clamp and proceed with the necessary machining.

Remove the work and bring the next piece to be machined into light but positive contact with the ball end of the rod. Tighten the vise and the machining cycle can be repeated.

The flexibility and rapid adjustment of this device to a wide variety of jobs have caused much favorable comment throughout our shop.

• • •

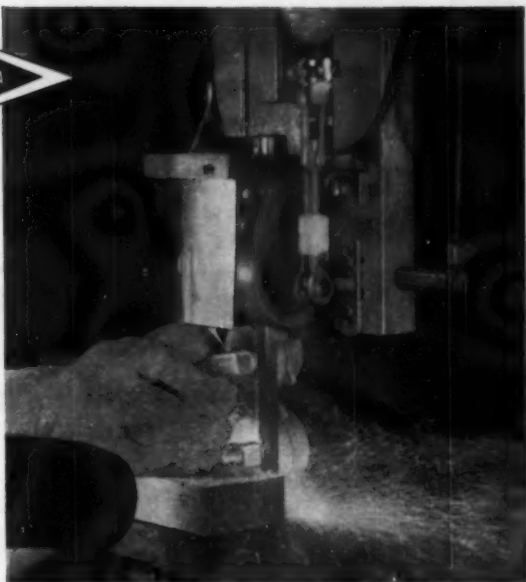


Standard magnetic base used as mill stop for repetitive work on milling machine.



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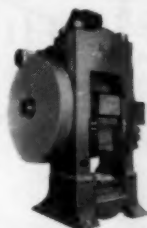
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## Free Literature

To receive the booklets described below, circle their identifying numbers on the Action Card found opposite pages 32 and 160.



(See Number 1)



(See Number 3)



(See Number 5)

**1. Precision Turret Lathe.** Bulletin describing Rivett 60 Series precision turret lathe, emphasizing "one motion control" and automatic indexing turret. Rivett Lathe and Grinder, Inc., Brighton 35, Boston, Mass.

**2. Electrical-Mechanical Positioners.** Bulletin 500A showing new electrical-mechanical Hanna-Powr positioners, including uses, specifications, and dimensions. Hanna Engineering Works, Dept. PR-27, 1765 Elston Ave., Chicago 22, Ill.

**3. "Turn with Tape."** Bulletin on LeBlond Tape Turn lathes with specifications, operating costs, controls, and time analyses. R. K. LeBlond Machine Tool Co., Madison at Edwards Rd., Cincinnati 2, Ohio.

**4. How to Save Tooling Costs.** Folder on special jigs and fixtures which could be used for standard jobs. Included are specific money- and time-saving devices. Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland.

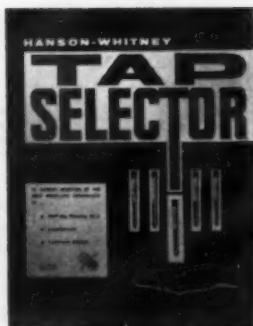
**5. Turret Drilling Machines.** Bulletin on Avey 6- and 8-spindle turret drilling machines with details on speeds, feeds, controls, table sizes, specifications, and dimensional drawings. The Avey Division, Motch and Merryweather Machinery Co., Box 1264, Cincinnati, 1.

**6. Automatic Chucking Machine.** Bulletin SM45 describing Brown and Sharpe No. 2 automatic chucking machine with specifications, cost-saving features, and typical production examples. Brown and Sharpe Mfg. Co., Providence 1, R.I.

**7. High-Speed Steel Drill Sharpener.** Folder on new Ampak electrolytic high-speed steel drill sharpener describing capabilities, features, and specifications. Connecticut Special Machine, Inc., Bridge St., Winsted, Connecticut.



(See Number 10)



(See Number 15)



(See Number 18)

**8. Gage Modifications.** Booklet, entitled "Ideas," showing gage modifications, stock components, assemblies, common problems, and their solutions. Boice Gage, Inc., Hyde Park, N.Y.

**9. Punches, Dies, and Rivet Sets.** Catalog 60 describing punches, dies, rivet sets, and compression riveter dies of all sizes and shapes, including stock lists. George F. Marchant Co., 1420 S. Rockwell St., Chicago 8, Ill.

**10. Threading Machine.** Brochure explaining new Thred-O-Matic 22-A pipe, conduit, and bolt threader, with major features and specifications. Collins Machinery Corp., 955 Monterey Pass Rd., Monterey Park, Calif.

**11. Welding Helmets and Hand Shields.** Bulletin 1407 describing Oxxweld welding helmets and hand shields, with shade selection and accessories. Linde Co., Division of Union Carbide Corp., 270 Park Ave., New York 17, N.Y.

**12. Belt Grinder.** Brochure on precision belt grinder with applications and specifications. Industrial Machines and Services, Inc., P.O. Box 995, New Britain, Connecticut.

**13. Cranks, Handles, and Wheels.** Catalog of Balcrank products including order numbers and dimensional charts. Balcrank, Inc., Cincinnati 9, Ohio.

**14. 5- and 10-ton Presses.** Catalog on Havar Press-Rite Juniorline 5- and 10-ton presses contains specifications and price lists. Havar Mfg. Co., 444 N. Cleveland, St. Paul 4, Minn.

**15. Tap Selector.** Publication listing over 1,200 sizes and types of stock taps with recommendations and prices. The Hanson-Whitney Co., 169 Bartholomew Ave., Hartford, Conn.

**16. Isolation of Machine Vibration.** Booklet describing Perf-O-Grip Vibra-Mount methods of isolating transmitted machine vibrations with descriptions of felt mountings and hints on vibration control materials. American Felt Co., 2 Glenville Rd., Glenville, Conn.

**17. Indicating Snap Gage.** Folder showing adjustable indicating snap gage with specifications, ranges, and prices. Mahr Gage Co., 274 Lafayette St., N.Y.C.

**18. Sanding Discs.** Brochure on new filter-backed abrasive discs. Shows use in polishing and blending applications. The Carborundum Co., P.O. Box 337, Niagara Falls, N.Y.

**19. Cold Repair Systems.** Catalog of Metalock cold repair systems for cracked or broken castings and forgings, with description of service. Metalock International, Inc., 36-15 48th Ave., Long Island City 1, N.Y.

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**20. Tooling Balls.** Bulletin on stainless-steel tooling balls including applications and specifications. Ball Division of Industrial Tectonics, Inc., 3686 Jackson Rd., Ann Arbor, Mich.

**21. Accordion-Sleeve Protection.** Bulletin on Gortite sleeves showing needs, applications, and sizes. A and A Mfg. Co., Inc., 712 S. 12th St., Milwaukee 4.

**22. Mobile Platform Scale.** Catalog 161 on Hydroscale, with mountings, capacities, and prices. Hydroway Scales, Inc., P.O. Box 531, Oakridge Station, Royal Oak, Mich.

**23. Precision Boring.** Bulletin describing new models of Fosdick jig borers. Fosdick Machine Tool Co., Cincinnati.

**24. Special Work Bench.** Brochure on special work bench for metalworking industry including specifications and applications. Dept. WBB, Manzel, 315 Babcock St., Buffalo 10, N.Y.

**25. Standard Bearing Sizes.** Brochure of 1066 standard bearing sizes carried by Amplex, including Oilite and super Oilite lines. Also engineering data on self-lubricating bearings. Amplex Division, Chrysler Corp., Box 2718, Detroit.

**26. Industrial Diamond Products.** Catalog A60 on diamond dressing tools featuring specifications and price lists.

Diamond Tool Research Co., Inc., 380 Second Ave., New York 10, N.Y.

**27. Tool Room Grinding.** Booklet containing information on grinding and sharpening for tool makers and tool room foremen. Macklin Co., Jackson, Michigan.

**28. Precision Boring Tools.** Catalog on Kamset multi-point precision boring cutters showing shapers, sizes, cartridges, inserts, accessories, and adapters. Adjusting information included. Valenite Metals, Box 205, Royal Oak, Mich.

**29. Drill Grinder.** Bulletin 4000A on features and operations of Farrel-Sellers No. 46 drill grinder. Farrel-Birmingham Co., Inc., Consolidated Machine Tool Division, 565 Blossom Rd., Rochester 10, N.Y.

**30. Spherical Corners.** Catalog 611 describing spherical corner transitions for eliminating square inside corners; charts showing basic corner sizes and metal types included. Conner Steel Products, P.O. Box 25, Southfield, Mich.

**31. Valve Tap.** Bulletin on stationary and rotary valve taps, including diagrams of sizes, shapes, and lengths. Landis Machine Co., Waynesboro, Pa.



(See Number 23)



(See Number 28)



(See Number 31)

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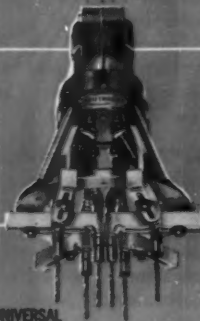
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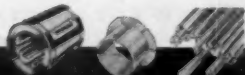
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**32. Precision Universal Drive.** Bulletin describing Gyro-Drive for any power drill, showing mounting, design, and price. Glenwood Gyro-Drive, Inc., Glenwood, Minn.

**33. Lathes and Milling Machines.** Brochure describing South Bend lathes and milling machines with specifications, prices, and distributors. South Bend Lathe, Inc., 425 E. Madison St., South Bend 22, Ind.

**34. Optical Comparators.** Book and catalog 6013 on optical comparators and measuring machines with sections on basic measuring, accessories, applications, and electronic components. Jones and Lamson Machine Co., Springfield, Vt.

**35. Machine Tool Motor-Generators.** Booklet 3064 on General Electric's machine tool motor-generators for feed drive power-supply systems with discussion on use with nominal- and variable-voltage outputs, operating characteristics, and typical connections. Performance and designs included. General Electric Co., Schenectady 5, New York, N.Y.

**36. "Barrel Finishing."** Booklet 501 describes various barrel-finishing processes and equipment, with recommendations for abrasive shapes and sizes. Also practical suggestions on operation procedures. Norton Co., Worcester 6, Mass.

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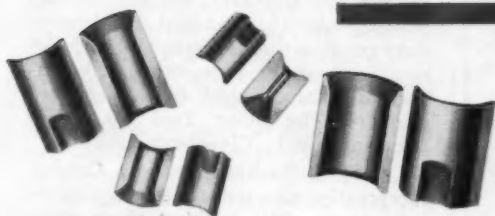
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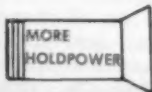
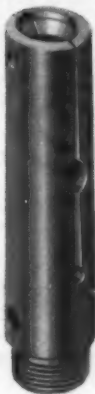
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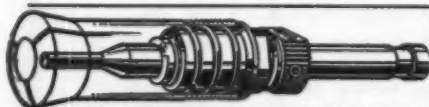
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**37. Tool Components and Their Applications.** Booklet clarifies concept of standardized tool application. Examples of tools for use with jigs, fixtures, other tools, and dies. Time-saving ideas. PIC Design Corp., 477 Atlantic Ave., East Rockaway, L.I., N.Y.

**38. Variable-Speed Drives.** Bulletin 551 on variable-speed drives showing principle of operation, traction, control, and selection. Graham Transmissions, Inc., Menomonee Falls, Wis.

**39. A Guide to Better Centers.** Brochure includes purpose, errors, measurement, correction, and requirements of centers. Common problems of centers and their solutions illustrated. High Precision Products, Westfield, N.J.

**40. Numerical Control System.** Bulletin 157-2 on Natco's numerical control system with types and specifications. National Automatic Tool Co., Richmond, Ind.



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**42. A. S. A. Bushing Symbols.** Catalog of recently adopted American Standards Assoc. drill bushing sizes, symbols, and prices, as well as ACE bushing information. ACE Drill Bushing Co., Inc., 5407 Fountain Ave., Los Angeles.

**43. Ceramic Cutting Tools.** Catalog 960 describing Stupalox ceramic cutting tools, their dimensions, and prices. Dept. BMD, The Carborundum Co., P.O. Box 337, Niagara Falls, N.Y.

**44. Setups.** Catalog 1161CJ on ways to make setups easier and quicker with specifications and prices on Universal equipment. Universal Vise and Tool Co., Parma, Mich.

**45. Vapor-Spray-Vapor Degreasers.** Bulletin 21 describing degreasers, including principle of operation, solvent cycles, and specifications. Phillips Mfg. Co., Inc., 3475 W. Touhy Ave., Chicago.

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**53. Hole Relation Gage.** Bulletin M12 on "Con-Chek" gages, including models, ranges, and specifications. Mayes Tool Co., 26514 W. Seven Mile Rd., Detroit.

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**57. Carbide Cutting Tools.** Brochure 3-61 showing Wesson standard and special carbide turning, milling, and boring tools. Annotation on Wesson catalog. Wesson Co., 1220 Woodward Hgts Blvd., Ferndale 20, Calif.

**58. Welding, Brazing, and Soldering Alloys and Fluxes.** Wall Chart covering All-State welding, brazing, and soldering alloys and fluxes for use with common base metals. Description of aluminum joining alloy. All-State Welding Alloys Co., Inc., White Plains, New Jersey.

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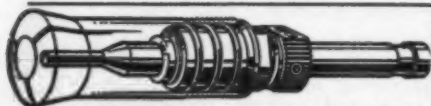
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*"I shall propose to the Congress a new tax incentive for businesses to expand their normal investment in plant and equipment."*

President John F. Kennedy

**M**odernization of plant facilities, replacement of productive equipment and capacity to produce are at long last occupying the attention of Washington. The President showed a commendable awareness of three major problems which must be attacked if our country is to remain strong: economic growth, plant modernization and price stability.

Before a packed house, he expressed thoughts every business held dear, and which every businessman had been trumpeting for years. "Capacity operation is the key. No matter what other arguments or stimulants are used, the incentives for investing new capital to expand manufacturing plants and

equipment are weak as long as manufacturers are operating at less than 80% of capacity. From 1950 to 1958 we put only one sixth of our total output into capital formation, while Japan, Germany, Italy, the Netherlands, Canada, and Sweden were all investing one fifth or more of their total output in capital goods. So it is not surprising that each of these and other nations over the past several years has surpassed us in average annual rate of economic growth."

In speaking of plant modernization the President said, "New plant investment not only means expansion of capacity; it means modernization as well. Gleaming new factories and headlines about automation have diverted our attention from an aging industrial plant. Obsolescence is slowing down our growth, handicapping our productivity, and worsening our competitive position abroad."

\*President John F. Kennedy's address to the luncheon meeting of the National Industrial Conference Board, Washington, D.C., February 13, 1961.

## THE U.S. IS "FALLING BEHIND"

"Nothing can reverse our balance-of-payments deficit if American machinery and equipment cannot produce the newest products of the highest quality in the most efficient manner. The available evidence on the age of our industrial plant is unofficial and fragmentary; but the trend is unmistakable—we are falling behind.

"The average age of equipment in American factories today is about nine years. In a dynamic economy, that average should be falling, as new equipment is put into place. Instead, the available evidence suggests that it has been slowly rising. Private surveys of machine tools used by manufacturers of general industrial equipment found less than half of these tools over ten years old in 1949, but two thirds over that age in 1958. Nineteen per cent of our machine tools were found to be over twenty years old.

"Meanwhile, other countries have been lowering the average age of their fixed capital. The German example is the most spectacular: their proportion of capital equipment and plant under five years of age grew from one sixth of the total in 1948 to two fifths in 1957.

"All of these facts point in one direction: We must start now to provide additional stimulus to the modernization of America's industrial plant. Within the next few weeks, I shall propose to the Congress a new tax incentive for businesses to expand their normal investments in plant and equipment."

## PRICE STABILITY AND INFLATION

The President realizes that the government is almost without "direct and enforceable powers over the central problem." He continued, "A free government in a free society has only a limited influence over prices and wages freely set and bargained for by free individuals and enterprises. And this is at it should be if we are to remain free.

"Nevertheless, the public interest in major wage and price determination is substantial. Ways must be found to bring that public interest before the parties concerned in a fair and orderly manner. For this reason, I have announced my determination to establish a Presidential advisory committee on labor-management policy, with members drawn from labor, management, and the public. I want this committee to play a major role in helping promote sound wage and price policies, productivity increases, and a betterment of America's competitive position in world markets. I will look to this committee to make an important contribution to labor-management relations, and to a wider understanding of their impact on price stability and economic health. And in this undertaking, I ask and urge the constructive co-operation of this organization and its members.

"Economic growth, plant modernization, price stability—these are all intangible and elusive goals. But they are all essential to your success, and to the success of our country. Initiative, innovation, and hard work will be required, on your part and on ours."

• • •

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(In U.S.A.)**

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- —neoprene flexible coolant line
- —magnetic nozzle holder positions anywhere
- —controlled discharge

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MILWAUKEE, WIS. U.S.A.

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**RODNEY DAVIS CO. MOVES**

Rodney Davis Gear Co. has moved to 235 W. Dauphin St., Philadelphia. President Jon T. Moore says that \$150,000 worth of new turret lathes, saws, and other machine tools have been leased from Jones and Lamson Machine Co., Springfield, Vt.,

**NEW PLANT FOR DIEBEL**

Diebel Die and Manufacturing Co., formerly located on Irving Park Rd., Chicago, has begun operating in a new plant in Morton Grove, Ill. The firm, founded in 1937 in Chicago, will continue to specialize in manufacturing complex parts and mechanisms

**SULLIVAN NAMED REP.  
ON WEST COAST**

Oberg Mfg. Co., Inc., Freeport, Pa., carbide die manufacturer, has named Sullivan Assoc., Glendora, Calif., as the company's West Coast sales representative.

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SHORT RUN  
STAMPINGS?**



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**FEDERAL STAMPING CO.**  
7310 Atoll Ave., N. Hollywood Calif. TRiangle 7-0542  
**FEDERAL SHORT RUN STAMPING, INC.**  
910 Lyell Ave., Rochester 6, N.Y. Clearwater 4-9523

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MACHINE and TOOL BLUE BOOK

### **\$10 MILLION EXPANSION AT CERRO de PASCO SUBSIDIARY**

The \$10 million expansion program at Cerro de Pasco Corp.'s Fairmont Aluminum Co. in Fairmont, W.Va., is progressing, and the new facility is expected to be in operation sometime in the spring of 1961. This will make the aluminum rolling mill one of the largest of its type in the country. Coil and sheet output will be increased nearly 150% because of the expansion.

### **TEC ENGINEERING TO REPRESENT S-P MANUFACTURING IN INDIANA**

TEC Engineering Corp., Logansport, Ind., has been named factory representative in Indiana of S-P Manufacturing Corp., Solon, Ohio, and will offer a complete line of standard air and hydraulic cylinders, high-pressure hydraulic cylinders, valves, and accessories.

### **ULTRASONIC INDUSTRIES MOVES**

Ultrasonic Industries Inc., formerly located at Albertson, Long Island, N.Y., has relocated at Engineers Hill, Plainview, L.I. The new facility will house sales, engineering, and manufacturing departments, as well as the Robot Metalcraft Corp., a subsidiary which specializes in precision sheet-metal fabrication.

### **HOPE RUBBER DISTRIBUTES HANNIFIN CYLINDERS, VALVES**

Hope Rubber Co., Inc., 40 Commercial St., Fitchburg, Mass., has been franchised to distribute Hannifin air and hydraulic cylinders and air control valves. Hope has been an active distributor for Parker industrial tube and hose fittings as well as Crown air regulators, filters and lubricators, also Parker-Hannifin products.

### **CHROMALLOY CORP. BUYS SHUNK**

The Chromalloy Corp., New York, has purchased Shunk Mfg. Co., Bucyrus, Ohio, maker of replaceable blades and cutting edges for earth-moving, road construction, road maintenance, and snowplow equipment.

## **GUARANTEED ACCURATE**

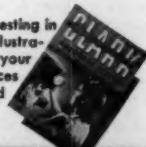


### **THE MOST FOR YOUR "ROCKWELL TESTING" DOLLAR!**

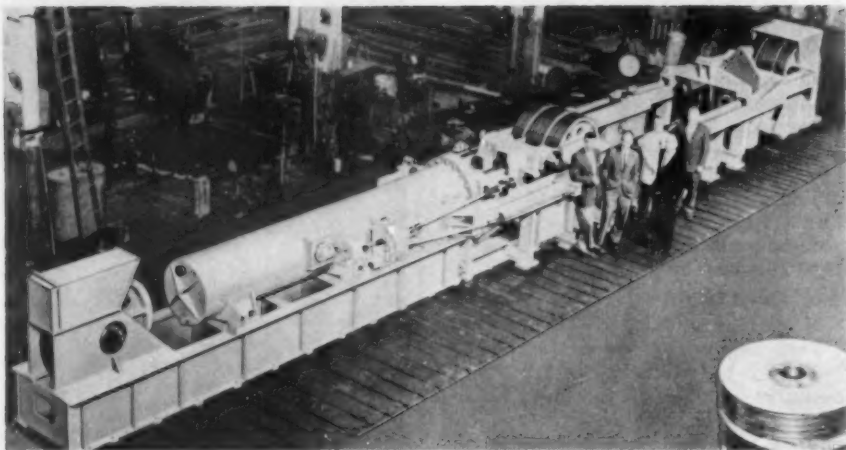
Clark Hardness Testers are guaranteed accurate for all "Rockwell Testing". Clark's exacting workmanship in the production of penetrators, testing blocks, anvils, and other accessories pays off in exceptional accuracy on the job. No wonder the low cost surprises our first-time customers. Clark Instrument, Inc., 10202 Ford Road, Dearborn, Michigan.

#### **FREE REFERENCE BOOK**

All information about hardness testing in easy-to-read text with many illustrations. Just write "Send Book" on your letterhead. Description and prices for Clark Hardness Tester and free Hardness Conversion Chart also available on request.



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#### **JERED TO BUILD ELEVATOR ENGINES FOR NEW AIRCRAFT CARRIER**

Pictured above is one of the aircraft elevator engines built by Jered Industries, Inc., Birmingham, Mich., for the aircraft carrier, Iwo Jima. Jered will also build four hydraulic elevator engines for the Navy's newest super carrier, the CVA-66, a modified version of the Forrestal class. These engines will be complete with electro-

mechanical control systems for use in raising and lowering aircraft between the hangar and flight decks.

The aircraft handling equipment will be built at a total cost of approximately \$2,000,000 and each elevator is expected by the company to lift more than 350,000 lbs., which is twice the amount capable of the pictured unit.

---

#### **CHEMETRON CORP. BUYS DETROIT CHEMICAL CO.**

Chemetron Corp. of Chicago has purchased the Northwest Chemical Co. of Detroit. The company will become a part of the Chemical Products Division of Chemetron. Products of the 28-year-old Detroit firm include metal cleaners, acid addition agents, phosphate coatings, paint strippers, and other chemicals for conditioning ferrous and non-ferrous metals before plating, welding, enameling or painting.

Northwest Chemical Co.'s plant and offices will remain at 9310 Roselawn. Harold J. McCracken, B. F. Lewis, and Helen M. Morell, officers and founders, will retain charge of operations.

---

#### **SPECIAL DIE-SET FACILITIES AT PRODUCTO PLANT IN CHICAGO**

Philip R. Marsilius, executive vice-president of Producto Machine Co. has announced that new manufacturing facilities for special die sets are now in operation at the company's Chicago plant.

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#### **IDEAL DRIVING CENTERS SOLD**

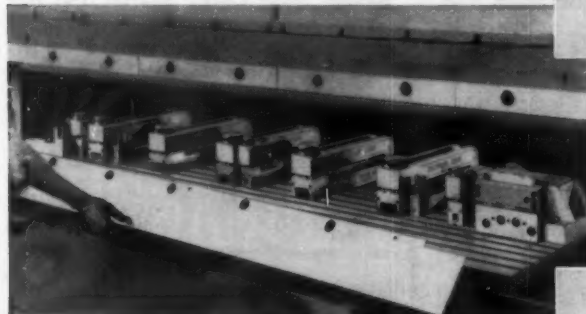
The entire inventory of Ideal driving centers of Ideal Industries, Inc., Sycamore, Ill., has been purchased by Power Grip, Inc., Rockfall, Conn., manufacturer of lathe and screw machine accessories. The centers will be marketed under the Power Grip name.

# UNI-PUNCH®

## UNITIZED TOOLING for HOLE PUNCHING and NOTCHING

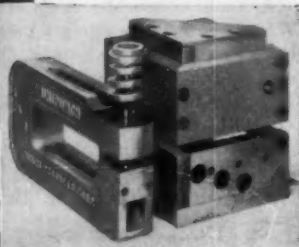


Set-up of Unipunch Series "A" Hole Punching and Notching Units on a template. Series "A" Units punch and notch up to  $\frac{1}{4}$ " thick mild steel.

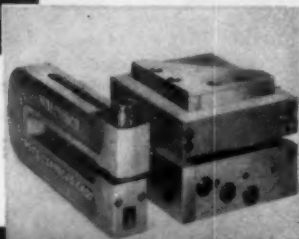


Set-up of Unipunch Series "B" Hole Punching and Notching Units on a T-slotted plate. Series "B" Units punch and notch up to  $\frac{1}{8}$ " thick mild steel.

Unipunch Tooling System produces custom setups with standard units for punching and notching sheet metal. Set-up units outside press; slide onto press bed; and produce parts with first stroke of ram—nothing attached to press ram... no press downtime.



Unipunch self-contained Units permanently align punches and dies—no adjustments. Units are used and reused in press and press brake set-ups—as "dead" storage and no special capital equipment required for production of parts from sheet metal, plates, angles, channels or extrusions.



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## **PRATT & WHITNEY ANNOUNCES TRADE-IN PLAN ON MACHINES**

"For too long, machine tool builders have ignored the needs of their customers to dispose of surplus machinery when buying new equipment," explained Paul Stanton, vice-president-marketing for Pratt & Whitney, in announcing details of a machinery trade-in plan.

Effective immediately, according to Stanton, his company will begin accepting used or surplus machine tools of any manufacture as part payment or for credit toward the purchase of new Pratt & Whitney products.

A new corporate unit of Fairbanks Whitney, P&W's parent company, has been established to handle these trade-ins. It has been named the Machinery Trading Corporation. Stanton emphasized the fact that P&W is not in the used machinery business and P&W personnel would not be involved in the sale of used machinery. However, the two Fairbanks Whitney units will work closely together to give one-stop service.

## **WARNER ELECTRIC HAS JAPANESE SUBSIDIARY**

Warner Electric Brake & Clutch Co., Beloit, Wis., has established a Japanese subsidiary, **Warner (Japan) Ltd.** of Tokyo. The subsidiary is 85% owned by Warner Electric and 15% owned by Shinko Electric Co., Ltd. Under the agreement, the subsidiary will license Shinko Electric to manufacture and sell Warner Electric brakes and clutches throughout the Far East.

## **ECLIPSE REPRESENTED IN CANADA**

Alexander Tools, Ltd. at Montreal, Quebec, and Barmac Supplies, Ltd. at Toronto, Ontario, have been appointed Canadian representatives for **Eclipse Counterbore Co.**, Detroit, producer of end cutting tools.

## **SANDVIK HAS NEW CHICAGO OFFICES**

Sandvik Steel, Inc., Fair Lawn, N.J., has moved its Chicago branch office to the company's new building at 7520 N. Long Ave., Skokie, Ill. The office will continue to sell and service Sandvik specialty cold-rolled spring steels, Coromant carbide tooling, steel-belt conveyors, power springs, hand saws and tools.

## **NEW GEAR RESEARCH BUILDING**

Philadelphia Gear Corp., King of Prussia, Pa., manufacturer of precision gears, industrial gears and power transmissions, has begun construction of a new gear research building and pattern shop.

## **NEW UNIT FOR SHARON STEEL**

Sharon Steel Corp., Sharon, Pa., has broken ground for a new vacuum stream droplet degassing unit which company officials say will give customers high quality steel in all sizes and grades.



#### HEPPENSTALL GETS AWARD

Robert B. Heppenstall, president of the Medvale-Heppenstall Co., Philadelphia, has been awarded the William Hunt Eisenman Medal for service, devotion, and foresight in the metals industry by the American Society for Metals.

#### LEVINS NAMES REPRESENTATIVES

Russell-Holbrook and Henderson, New York, have agreed to be exclusive representatives in New England for Louis Levin and Son, Inc., Culver City, Calif., manufacturer of high precision lathes and micro-drilling equipment.

#### NEW CENTER FOR CARPENTER

Carpenter Steel Co., Reading, Pa., has opened a new \$300,000 mill-branch warehouse and specialty steel service center in Los Angeles, thus tripling service to that area.

#### DORSEY GAGE CO.

##### COMPLETES PLANT ADDITION

The Dorsey Gage Co., Inc., Hyde Park, N.Y., manufacturers of precision gages, measuring instruments, and related products, has completed an addition that will double its facilities and manufacturing space. Allen Linderholm will be in charge of engineering and research, as well as the development of new products. He comes to the firm with approximately 20 years' experience in gage engineering design and production background.

#### MATTICKS NAMED AS ELGIN WHOLESALER

Abrasives Division of Elgin National Watch Co., Elgin, Ill., has appointed the Matticks Co., 4176 E. Pacific Way, Los Angeles, as western wholesaler for Golden solid carbide tools.

## FAST, CLEAN, ECONOMICAL HEAT

Provides high, fast heat for metal bending, metal forging, occasional heat treating, metal forming and preheating. Clean, efficient, equipped with four burners. Two end burners have separate shutoff valves, may be turned off for smaller jobs. Operates economically on any type of gas. Convenient gas-air adjustment panel. Adjustable swinging refractory lid. Adjustable front rack to support long pieces and hold tools. Solenoid safety valve turns gas off automatically when blowers are turned off. High temperature, insulated firebox, 5½" by 7½" by 27". Maximum 425,000 BTU input. F.O.B. Factory \$246.00.

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# Appointments and Promotions

## Personnel Changes . . . Executive and Production



C. S. Beshore



R. R. Winn



J. S. Howey



J. K. Rye

The Yoder Co., Cleveland, has named **Eugene L. Mackey** vice-president in charge of engineering . . . **Norton D. Skinner** was appointed manager of technical services, and **Albert R. McCallum** was made special automotive consultant for the Clearing division of U. S. Industries, Inc., Chicago . . . The Yale and Towne Mfg. Co., Philadelphia, named **Charles S. Beshore** manager of the Materials Handling division . . .

**Robert C. Jacobs** was promoted to general manager of the Automotive Gears division of Eaton Mfg. Co., Cleveland . . . National Twist Drill and Tool Co., Rochester, Mich., appointed **Rex F. Supernaw**, chief metallurgist . . . **Henry L. Burghoff** was made director of research and development for Chase Brass and Copper Co., Waterbury, Conn. . . Birdsboro Corp., Birdsboro, Pa., appointed **Harold C. Sproule** manager of the Hydraulic division of the Reading, Pa. plant . . . **Donal R. Whitney** was named quality-control manager for Whitney Chain Co., Hartford, Conn. . . Ex-Cell-O Corp., Detroit, appointed **Henry Lapeza** controller and **Frank J. Rogers** to head its internal audit department. **Russell D. Hughes** was made assistant general manager of the company's Cadillac Gage division at Costa Mesa, Calif. . . **John S. Howey** and **Edgar E. Jones** were appointed factory representatives for Rotor Tool Co., Cleveland . . . Bendix Corp., Detroit, named **Roy R. Winn** Great Lakes regional manager of the Industrial Controls section . . . **Bernard Kardon** was appointed director of engineering at Ultrasonic Industries, Inc., Plainview, N.Y. . . Rotor Tool Co., Cleveland made **Thomas L. Whitehouse** field engineer . . . **R. C. Dublin** was elected secretary of the High Speed Hammer Co., Inc., Rochester, N.Y. He succeeds **R. F. Ahlheim** who has retired . . . Also



Donal R. Whitney



E. E. Jones



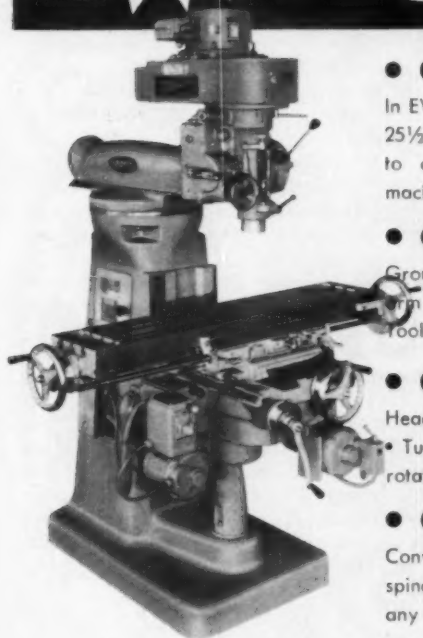
T. L. Whitehouse



K. R. Beardslee



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## • GREATER RANGE—

In EVERY category than ANY machine in its class •  $25\frac{1}{2}$ " of ram travel • Spindle to table and spindle to column—Range greatly exceeds competitive machines, PLUS many other dimension advantages.

## • GREATER ACCURACY—

Ground lead screws • Hand scraped ways • Over-run stays in one plane • Locks without distortion • Tool room accuracy in manufacture of components.

## • GREATER VERSATILITY—

Head tilts  $45^\circ$  forward and back, rotates  $360^\circ$  on ram • Turret rotates  $360^\circ$  on column • Power assembly rotates  $360^\circ$  around spindle • Many other features.

## • GREATER EFFICIENCY—

Convenient controls • 9 spindle speeds, 3 power spindle feeds (up or down) • 4-way head handles any compound work angle • Greater work area.

## • GREATER DURABILITY—

Index quality throughout for long trouble-free life.

## • PROVEN ACCESSORIES AND EXTRA EQUIPMENT—

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HEAVY DUTY "55" VERTICAL MILL  
AND  
MODEL "60" HORIZONTAL MILL.

# INDEX

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Supersensitive Anderson Balancing Ways (Stand or Pillow Block Type) will static-balance rotating parts easier, faster, more accurately. No setup, no leveling, no centering. Glass-hard spindles and bearings prevent wear or ball-bearing indentations when balancing heavy work. Superior accuracy lasts throughout long life. Proved and preferred over 40 years.



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Anderson Hand Scrapers are: (1) faster cutting, (2) easier to use, (3) just the right spring, (4) palm fitting grip, (5) 18" - 20" - 22" lengths. Saves costly regrinding.

**\$6.75** (18") with high speed blades

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J. B. Driscoll



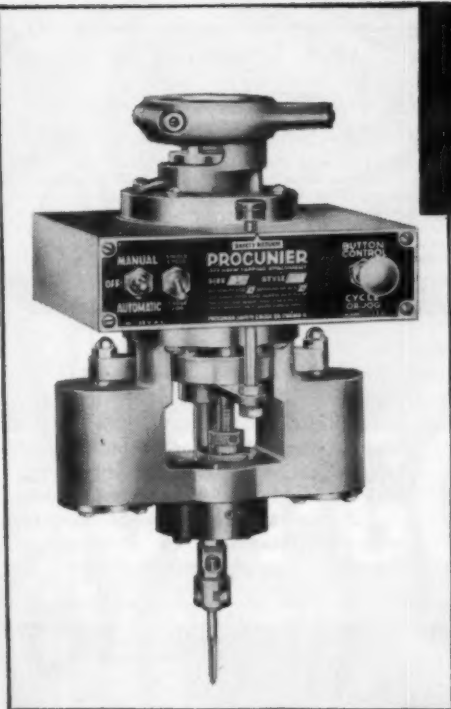
T. W. Clark

retiring is **Kenneth R. Beardslee** as consultant to the metallurgical products department of General Electric Co., Detroit . . . **USI Robodyne** division of U. S. Industries, Inc., Silver Spring, Md., announces the appointment of **John D. Goodell** as president and general manager . . . **John K. Rye** has been elected president of F. Jos. Lamb Co., Detroit . . . The Braeburn Alloy Steel Corp., Pittsburgh, appointed **Charles W. Schuck** executive vice-president . . . **Thomas W. Clark** has been named president and general manager of the Threadwell Tap and Die Co., Greenfield, Mass. Electric Autolite Co. has appointed **J. B. Driscoll** manager of production at its Decatur, Ala., plant . . . **John D. Goodall** has been made general manager of Ball division of Industrial Tectonics, Inc., Ann Arbor, Michigan.



J. D. Goodall

Size Control Co., a division of American Gage and Machine Co., Chicago, appointed **Peter J. Sommer** vice-president and general manager, and **Thomas**



## TAP GAUGE PERFECT PARTS *Everytime!*

### NEW LEAD SCREW TAPPER with PUSH BUTTON CONTROL

Now you can tap any quantity of practically any material, with absolute precision, without rejects, without stripped threads or distortion. Tests have shown it produces parts that pass 100% inspection—100% acceptable! The secret is in the tap control mechanism which feeds the tap automatically without any pressure. The Lead Screw controls the tap and guides it steadily through each cycle, guaranteeing supreme accuracy. In addition, it offers convenient 5-way operation, pushbutton and foot control for complete cycle or jog, automatic (without foot or hand controls) or with switch fixture for full cycle. Either way, you get uniformity, speed and precision that's unparalleled!

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N.C. in all S.A.E. sizes.



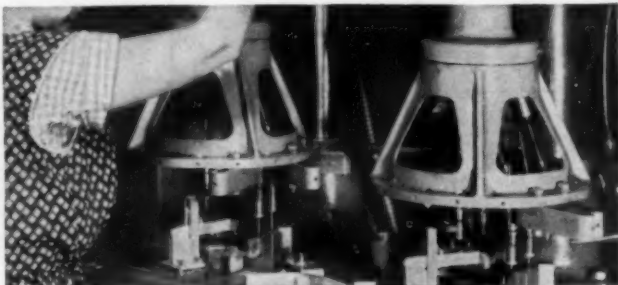
**HEIMANN MFG. CO. • URBANA, OHIO**

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**J. Owen** vice-president of manufacturing . . . **Roland C. Crans** was promoted to assistant chief engineer of Holcroft and Co., Detroit . . . **J. Algot Johnson** has been named vice-president of research and engineering of the Nylok Corp., Paramus, N.J. The position had been formerly held by **J. E. Johnson**

who is now president of Aerospace Nylok Corp. . . . Consolidated, Diesel Electric Corp., Stamford, Conn., named **Jack Greenberg** assistant chief engineer of the Power Equipment division . . . **J. Stewart Cruickshank** has been promoted manager of International Harvester Co., Milwaukee division . . .

**Makes  
any  
drill press  
a HIGH**



## PRODUCTION TOOL in minutes!

With a MULTI-DRILL, you can go from hole-at-a-time drilling to real production in a matter of minutes! That's all the time it takes to mount any one of the many standard MULTI-DRILL adjustable multiple spindle drill press attachments on any drill press and put you into time and money-saving multiple drilling. Every MULTI-DRILL is quickly adjustable to drill a variety of hole patterns. Every MULTI-DRILL is designed for high production work. To learn how you can profit with a MULTI-DRILL, ask your nearby Commander Distributor to show and demonstrate the unit that meets your job requirements.



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'61

# INFORMATION & INSPIRATION

Just take a look at the typical information-packed conferences and symposia scheduled below, and we think you'll agree . . . you can't help but find here the information and inspiration you and your top people need to successfully meet today's conditions, tomorrow's challenges.

## Surface Metrology Seminar

Surface Specifications, Measurement Techniques, Predictions of Future Requirements and Developments

## Material Removal Symposium

Ultra High Speed, Electrolytic and Electron Beam Machining

## Manufacturing with Numerical Control Systems

## Use of Computers in Manufacturing Operations Management

## Application of Explosives in Metal Forming

## Workhold Developments

Electrostatic chucking and Fiberglass reinforced Plastic Clamping

## Numerically Controlled Machining Operations

## Operations Research . . . Process Planning

## Machining Malleable Iron and Cast Iron

## Press Tooling and Die Design

## Heat Treating Instruments

## Metal Cutting Carbides

## Work Simplification

## Precision Grinding

**FOR ADVANCE REGISTRATION** and all the advantages it brings just fill in the form below and mail it NOW, with registration fee to the American Society of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38, Mich. If you mail **before May 1st** you will receive, FREE, a \$10,000 ACCIDENTAL DEATH and DISMEMBERMENT POLICY covering you, 24 hours a day, from the time you leave home until you return . . . **plus** a time-saver Guest Badge that eliminates waiting in line at the Coliseum. After May 1st, bring your filled out registration card with you . . . save the time of filling it out at the Show.



'61

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ASTME 1961 CONVENTION  
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- over 400 EXHIBITS
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1:00 pm to 9:00 pm

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9:00 am to 5:00 pm

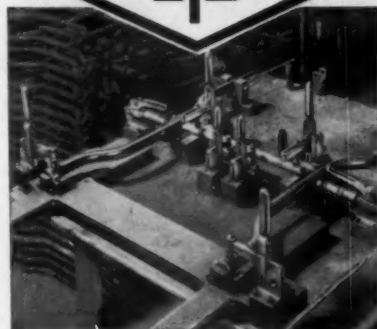
William C. Adamson was named works manager of Thor Power Tool Co. in Aurora, Ill. . . . Yale and Towne Mfg. Co. has appointed **Walter R. Saunders** north midwest regional manager for their Yale Materials Handling division . . . **Frank G. Miller** was promoted to plant manager at Climax Molybdenum Co., Langeloth, Pa. . . . **William A. Kerr** was elected vice-president of Bausch and Lomb Inc. and will be located in the Los Angeles area . . . Miniature Precision Bearings, Inc., Keene, N.H. has a new director in **Ralph F. Gow**, president of Norton Co., Worcester, Mass. . . . **Joseph C. Mogavero** was appointed manager of metal production operations of Metallurgical Products Dept., General Electric Co., Detroit . . . Chicago Pneumatic Tool Co. announced the appointment of **G. A. May** to the post of executive vice-president and general manager of the Allen Mfg. Co., Bloomfield, Conn. . .

#### PERSONNEL CHANGES SALES & SERVICE

**Raymond G. Sloan, Jr.** has been appointed sales manager of Magnetic Steel Products division of Armco Steel Corp., Middletown, Ohio . . . The Yoder Co., Cleveland, has appointed **Elmer A. Koenig** vice-president in charge of sales and **Theodore R. Stroemer** sales manager . . . **Edward P. Fisher** was named manager of finishing machine sales for the Osborn Mfg. Co., Cleveland . . . Woodruff and Stokes Co., Hingham, Mass., manufacturer of small precision tools, has appointed **Roy Bent, Jr.** sales manager . . . Named managers of marketing at Sharon Steel Corp., Sharon, Pa., were: **James W. Byrne**, hot rolled products; **Rollin E. Douglas**, special coated steels; **Walter A. Garrett**, Brainard strapping; and **Donald W. Meyer**, cold finished and coated products . . . **Thomas L. Mayes, Jr.**, was named sales manager of original-equipment manufacturing at the General Electric Co., Bloomington, Ill. . . . **Leland-Gifford**



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**FACT**  
YOU CAN DO  
BETTER WITH



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BECAUSE there's a De-Sta-Co clamp immediately available with just the holding power you need for any job—large or small.



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DETROIT STAMPING COMPANY

350 MIDLAND AVENUE  
DETROIT 3, MICHIGAN



# Coolley

## ELECTRIC

## HEAT TREATING

## FURNACES

41 Models—with and without

*Controlled Atmosphere*

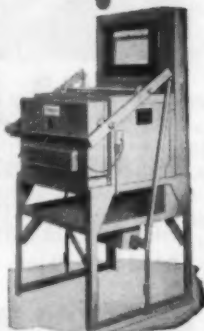
### RECIRCULATING OVENS

for drying, baking, etc. 3 Types—650° F., 850° F., and 1000° F. Wide range of sizes.



### INDUSTRIAL BOX FURNACE

for general heat treating to 2000° F. Highly efficient with low maintenance; quick repair with small down time; sturdy; reliable.



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- New GA Atmosphere Box Furnace
- Recirculating Air Draw
- Bench Types
- 2500° F Box Furnace

# Coolley

ELECTRIC MFG. CORP.

36 S. SHELBY ST.

INDIANAPOLIS 7, INDIANA

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E. P. Fisher



R. E. Jones

Co., Worcester, Mass., made **John Ratermann** sales manager in the Indiana-Ohio-Kentucky area . . . The Matthews Corp., Hawthorne, Calif., promoted **Raymond E. Jones** from general sales manager to vice-president of sales . . . **Frank D. Sullivan** has been named southwest sales manager for the Service Products division of Johnson's Wax, Racine, Wis., and will headquarter in Dallas . . . National Twist Drill and Tool Co, Rochester, Mich, has announced that **William E. Atchley** has been elected vice-president in charge of sales, **Fred D. Lamb, Jr.** has been named general sales manager, and **Howard M. Easton** assistant general sales manager . . . **Richard P. Taugner** has been appointed to the sales and service department of Wesson Co.'s Midcontinent District office in Elmhurst, Ill. . . **Leo Reierstad** has been named general sales manager of the Permanent Mold Die Co., Inc., Hazel Park, Mich. . . **Robert M. Miller** has been promoted to assistant sales manager of the Machine Tool division of DeVlieg Machine Co., Royal Oak, Mich.



R. M. Miller

**Josef H. Buerger, Jr.**, has been appointed sales director of the Crucible Steel Co., Pittsburgh . . . Standard Steel Works, a division of Baldwin-Lima-Hamilton Corp., Burnham, Pa., named **Donald Lade** general sales manager. **Mayor S. Silvey** was named contract

sales manager for Pratt and Whitney Co., Inc., West Hartford, Conn. **Frank J. Vlasaty** was named sales manager of Size Control Co., Chicago . . . **Charles L. Foley** was appointed to represent Newark Wire Cloth Co., Newark, N.J., in the central New England States . . .

## Eliminate Sharpening and Blade Adjusting



Wetmore Indexable Insert Milling Cutters are available in a wide range of standard types and sizes. Write for completely descriptive Catalog No. 06-D.

### with Wetmore Indexable Insert Milling Cutters

Simply unclamp and index the carbide inserts to renew the cutting edges—eight sharp edges per insert. Two-piece body construction permits precision grinding of insert seats during manufacture and insures perfect alignment of inserts after indexing.

Inexpensive replacement cost of indexable carbide inserts and their much greater convenience in milling operations lead to unprecedented economies. Wetmore designs utilize precision ground insert blanks that are standard with leading manufacturers and are readily available from local suppliers' stocks.

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**Wetmore Tool & Engineering Co.**

5320 E. Washington • Los Angeles 22, California

ANgelus 9-7266  
Phone: TWX: LA 2085



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**For** { **8-STATION PRODUCTION MACHINING**  
**1½" BAR AND COLLET WORK**  
**CHUCKING**  
**SINGLE POINT THREADING**

**Costs** { **\$7,167<sup>00</sup>**  
**FOB Factory**  
**Complete with all**  
**standard equipment**

This is an all new 1½" bar capacity ram type turret lathe with power feeds to all 8 working stations . . . that in addition to bar and collet work also has the versatility to do chucking, and when needed, single point threading. Powered by a 5 h.p., two-speed, geared motor, the new Sheldon 3 R turret lathe provides 16 spindle speeds, 60 different feeds to the carriage and cross-slide, and 180 different feeds to the ram turret.

The turret itself is ruggedly built and accurately machined to provide close tolerance indexing. And for complete ease of operation, it is put under power by simply pressing a push button on the control panel.

This new 3 R Sheldon is completely equipped with two-speed motor and electrical controls, coolant system and splash guards, LO spindle nose, large satin chrome dials and hardened bed ways. It also provides an additional cost saving feature—each turret face is drilled and tapped for your standard flange type tooling as well as being bored for your standard 1½" shank type tooling.

For versatile, accurate machining in either long or short runs, the new Sheldon 3 R provides the answer to low investment cost with high profit operation.



*Write for bulletin with complete specifications and tooling data*

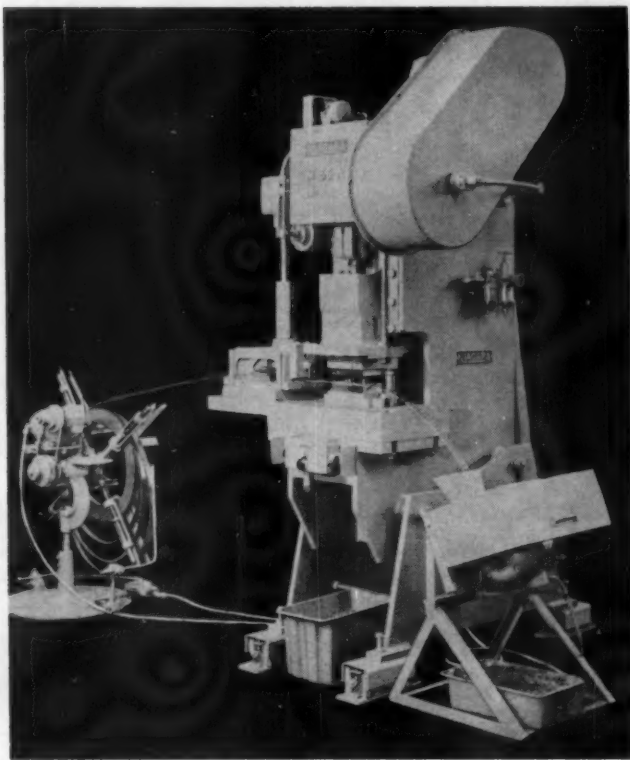
**SHELDON MACHINE CO., INC.**  
**4242 N. Knox Ave. • Chicago 41, ILL.**

Builders of 10", 11", 13", 15" Sheldon lathes, Sheldon Milling Machines, Sheldon Shapers and Sebastian Geared Head Lathes

See us at Booth 1250 ASTME Show, New York Coliseum.

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# What's New in Metalworking

**B**  
**B****14**

This 35-ton Niagara automatic OBI press operates at speeds up to 1000 spm.

## **AUTOMATIC OBI PRESSES FOR HIGH-SPEED, SHORT-STROKE WORK**

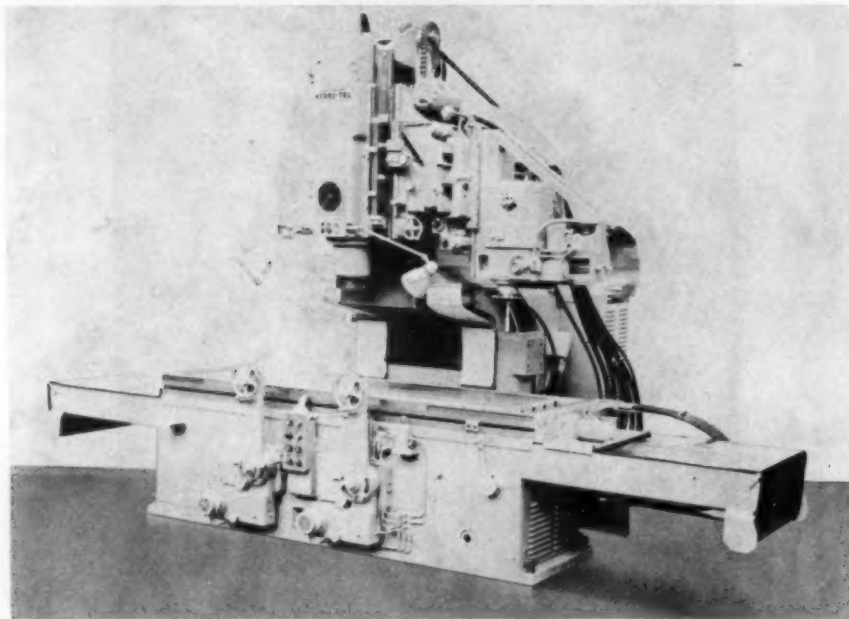
Niagara's new line of automatic, ultra-high speed OBI presses has been designed to boost production and reduce costs on short-stroke stamping jobs. These Series M presses feature an extra-rugged, welded, all-steel frame, low-inertia slide and connection, and non-metallic ways.

The line includes both non-g geared and single-g geared presses in 22-, 35-, 45-, and 60-ton capacities. Shaft diameters range from 2½" to 4".

The slide is designed specifically to meet the requirements of high-speed, precision stamping work: unusually long and rigid guiding; more mounting space; and symmetrical around-point-of-load application, for solid support and longer die life. Fully enclosed drives provide safer, cleaner operation as well as improved appearance.

Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N.Y.

Use postpaid card. Circle No. 59



#### **VERTICAL MILLING MACHINE PROVES VERSATILE**

A 28" vertical Hydro-Tel milling machine, for general purpose manually controlled milling, die sinking, automatic profile milling and multiple

spindle production milling, has been announced by Cincinnati Milling's Milling Machine Division.

Use postpaid card. Circle No. 60

#### **LEMPCO HYDRAULIC PRESS BRAKES**

A line of hydraulic press brakes for sheet metal and plate fabricators is being offered by Lempeco Industrial, Inc.

The machines range from 75 to 100 ton capacity and incorporate a new

mechanical-hydraulic valving device, which eliminates the former electronic servo control.

Lempeco Industrial, Inc., 5490 Dunham Rd., Bedford, Ohio.

Use postpaid card. Circle No. 61

### FLOATING AIR PLATFORM SAVES WEAR AND TEAR

A jig and fixture platform that floats the work on a thin film of air can now be obtained in one of two standard sizes in the Mighty Midget line.

The Flying Carpet floating air platform is an alloy-iron plate, ground parallel, with tiny orifices drilled in the bottom of it. These control a metered amount of air, thus lifting the

load a few thousandths of an inch above the machine table or surface plate. Or, the platform may be inverted and the work floated over it.

The platforms are available in 6" and 10" lengths x 5 $\frac{7}{8}$ " wide.

Sperman Metal Specialties, 2199 E. 21 St., Brooklyn 29, N.Y.

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### Measures the exact BORE or blind hole size! Reading .0001" Size: 3/16" to 4"

Takes accurate measurements of blind holes. No master — measures directly—by .0001". Automatic alignment, rectangular contact points guarantee extreme accuracy even when fully extended. Immediately detects out of round holes; with extensions measures holes up to 30" deep. Hardened contact points exert minimum pressure — will not damage fragile work.

Easy to read, deep graduations on a large diameter thimble. Dull chrome plated. Furnished in English or Metric graduations, individually or in sets.

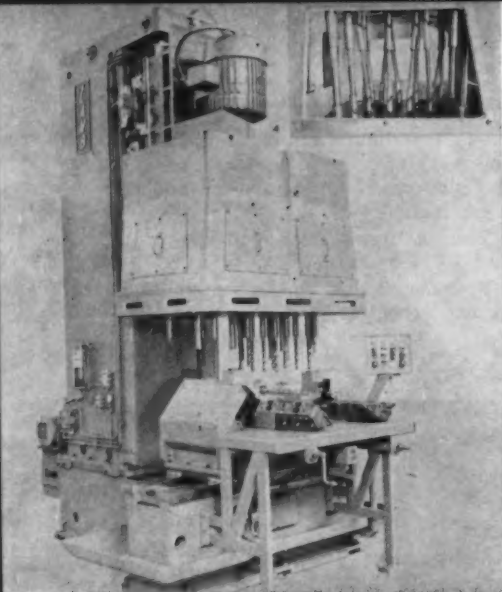
WRITE FOR CATALOG on complete line of precision measuring instruments: VERNIER CALIPERS, MICROMETERS, DIAL INDICATORS.



## ALINA CORPORATION

122 East Second St., Mineola, L. I., N. Y.

Use postpaid card. Circle No. 330



#### **SLIP SPINDLE DRILLING MACHINE FEATURES QUICK CONVERSION**

The 4-station, shuttle type, slip spindle machine shown here is one of twelve machines, built by the Lamb Co., that form a segmented production line for processing cast iron, V-8 or six cylinder truck engine heads.

The machine column, column base,

way type shuttle, drill head and universal housing are Lamb standard building blocks. The machine has 16 slip spindles but the drill head is equipped with 24 drives to accommodate hole pattern changes and/or additional holes in future workpieces. All machines in the line are equipped with extra drives. The spindle plate can be changed without disassembly of the head or universal housing.

A 2-position shuttle carries two fixtures that are hand loaded and clamped. The machining cycle is automatic. After operations are performed at Station No. 1, the slide shuttles to Station No. 2, then returns and stops. The operator removes the part, repositions it, and loads the second fixture. A new part is loaded into the first fixture. Heavy plugging bars align the head and fixtures at both shuttle positions.

The drill head and shuttle are actuated hydraulically. Machining operations are performed dry. Hardened and ground tool steel ways are used for the drill head and shuttle.

F. Jos. Lamb Co., 5663 E. Nine Mile Rd., Detroit 34, Mich.

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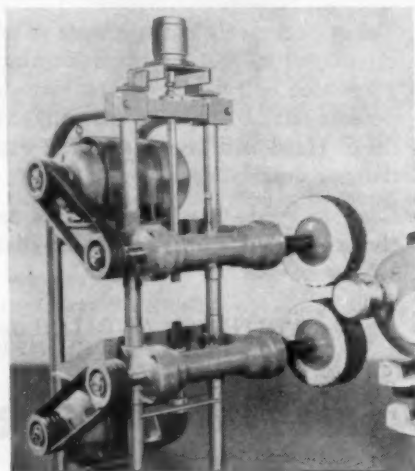
#### **FINISHING LATHE HALVES OPERATING TIME**

A dual-spindle, low-cost lathe, which handles polishing, buffing, deburring, and brushing jobs in half the normal time, is now available from Murray-Way. This lathe (Model L12) is claimed to be able to cut fixture costs, because only one semi-automatic part-positioning machine is needed instead of the usual two.

The L12 employs two separate motor-driven spindle assemblies which are mounted on one base. Each spindle is adjustable to compensate for wheel wear. The speeds of the wheels may be varied by a change of motor sheaves.

Murray-Way Corp., P. O. Box 180, Birmingham, Mich.

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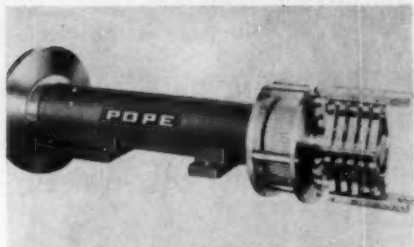


## SPINDLES FOR ELECTROLYTIC GRINDING COVER WIDE RANGE

Pope Machinery's line of motorized and belt driven spindles arranged for electrolytic grinding now covers the broad range between 50 amps. and 3000 amps.

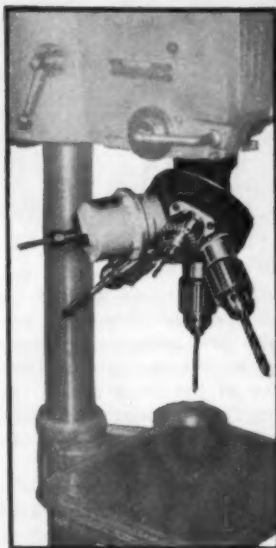
Insulation is built in and the spindles are equipped with a new, fork type brush assembly for cool operation.

Pope Machinery Co., 261 River St., Haverhill, Mass.



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## TAKE THE OUCH OUT OF TURRET DRILL COSTS with



DRILL, REAM, TAP,  
COUNTERSINK AND  
COUNTERBORE ON A  
COMMON TOOL AXIS.

# QUADRILL 4 & 5 SPINDLE TURRET DRILLING HEADS

CONVERT YOUR STANDARD  
DRILL PRESSES INTO PRECI-  
SION TURRET DRILLING MA-  
CHINES—one quadrill mounted on  
your drill press will ...

- Save you up to 70% in direct labor costs over in-line, single gang drill setups.
- Save you up to 350% in capital investment costs (other turret machines cost several hundred to thousands of dollars more).
- Do the work of 4 or 5 single drill presses—all work done at single hole location (increase production 50%, cut rejects, save floor space).

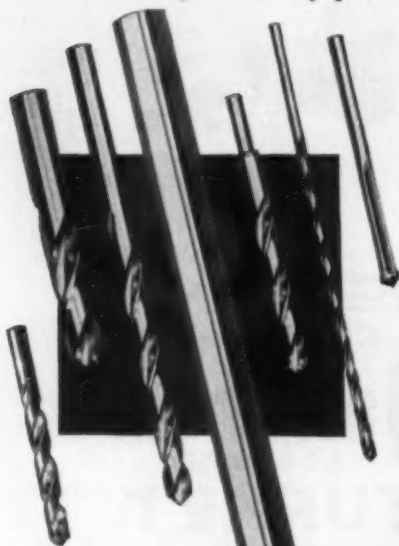
Ideal for both long and short runs ...  
fast setups ... simple tooling.

WRITE TODAY FOR BROCHURE  
**CHICAGO QUADRILL**  
*Company*

1846 BUSSE HIGHWAY DES PLAINES, ILLINOIS

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*Toughest, hardest, strongest  
... none finer at any price!*



*It pays to specify*

# ACE

**DRILLS  
REAMERS  
BLANKS**

**Premium Quality High Speed Steel  
Carbide Tipped and Solid Carbide**

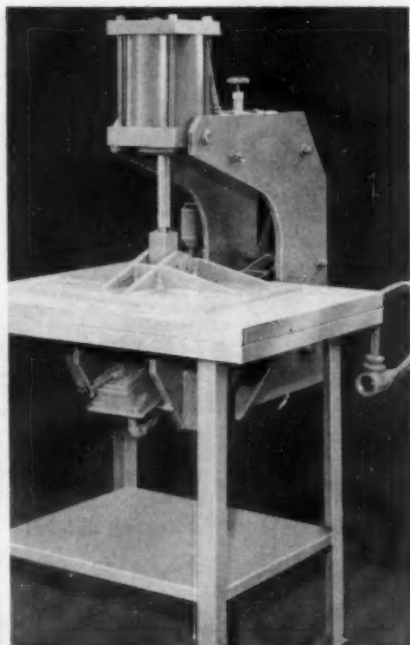
*Call your local distributor today—or write Ace  
direct for latest catalog and price information.*



**ACE DRILL**  
Adrian, Michigan

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

Use postpaid card. Circle No. 336



## **C-FRAME PRESS HAS TILTING TOP PLATEN**

A 2½-ton, all-welded, air-operated C-frame Acroplate press announced by Lake Erie features a top platen which tilts as it opens, giving 10½" of clearance at the front and 5" at the back. This feature simplifies and speeds the loading, inspection, and unloading of the work.

It can be furnished with aluminum drilled plates for the circulation of steam or hot oil for heating, or water for cooling. If desired, the drilled plates can be replaced with electric heating plates.

The general design of this press makes it well suited for a variety of pre-heating or chilling operations as well as low pressure molding or laminating.

Lake Erie Machinery Corp., P. O. Box 68, Buffalo 17, N.Y.

Use postpaid card. Circle No. 66

## AIR ACTUATORS SPEED COLLET AND CHUCKING OPERATIONS

Wil-Numat announces a line of air actuators for use on all hollow spindle machines to actuate either push or pull collets, expanding mandrels, rubber-flex collets or power chucks. Use of the hole through the spindle is retained for feeding coolant to work, feeding bar stock or reaching back of work-piece for various purposes.

The actuators operate off the shop air supply, multiplying gripping power at the jaws up to 80 times line pressure. Gripping power is adjusted by an air pressure regulator and a positive, uniform grip is maintained even when variations in stock diameter exist, eliminating slippage, scrap and possible tool damage.

Wil-Numat Corp., 411 South Hindry, Inglewood 1, Calif.

Use postpaid card. Circle No. 67


## UNISORB MACHINE MOUNTS

Easy-to-install machine mounts that provide precise leveling of equipment weighing as much as ½ ton have been developed by Unisorb. Designated the Series LR500, these mounts can be supplied with either 3" or 4" leveling bolts. Especially recommended for lathes, grinders, and other precision machine tools.

Unisorb Division, The Felters Co., 210 South St., Boston, Mass.

Use postpaid card. Circle No. 68

**USE SAWS?**  
**HACK • BAND • CIRCULAR**  
**KEEP THEM SHARP!**  
*Automatically • Economically*  
*Learn How—Write Today!*



**WARDWELL Mfg. Co.**  
 3807 Ridge Rd., Cleveland 9, O.

Use postpaid card. Circle No. 337

April, 1961




# NEW LOW PRICE

FOR A *Quality*  
TYPE HOLDER

Here's economy with no sacrifice of durability for heavy-duty, straight-line marking. Made of famous Meeco Safety Steel to prevent mushrooming and spalling.

Write for M • E • Economy Bulletin No. 681.



## M-E-ECONOMY

### TYPE HOLDER

A PRODUCT OF THE MARKING DEVICE INDUSTRY

**M. E. CUNNINGHAM CO.**

1048 CHATEAU STREET, PITTSBURGH 33, PA.

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## REDUCE BORING COSTS



MTBB-41

- Saves 80% time in finish sizing holes
- Repeat to .0001" in 30 seconds. No backlash
- Hardened and ground parts
- Improves quality
- 100% guaranteed

with  
**DEKA-BORE®**  
 OFFSET BORING HEADS!

Precision Tool & Mfg. Co. of Illinois  
 1305 S. Laramie Avenue • Cicero 50, Illinois  
 CLIP THIS AD to your letterhead!

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### AC-DC WELDER USES SINGLE PHASE

Offered in 300, 400, and 500 amp sizes, the Miller MD welder is claimed to be versatile and modestly priced. It has a continuous current control, an open circuit of 80 volts in both ac and dc, plus two welding currents in each, and straight or reverse dc polarity.

Miller Electric Mfg. Co., Appleton, Wisconsin.

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## for **DEPENDABLE** **HYDRAULIC PRESSURE CONTROL**

**FULFLO**  
BY-PASS RELIEF  
VALVES

**MONEY-SAVING CHOICE for  
O. E. M. use, replacement, too!**

Low price and high quality make FULFLO piston-type hydraulic valves a natural O. E. M. choice. The service they deliver . . . quiet, dependable and trouble-free . . . makes them ideal from the equipment users' viewpoint.

- Screw or flange models . . . to 500 lbs. . . for pipe sizes to 3"
- Steel, cast iron or brass bodies . . . brass, steel or stainless trim
- Fast shipment of standards . . . special to your requirements



#### FOR EXTRA CONTROL CONVENIENCE

Where frequent pressure setting is needed, install a FULFLO Hand Wheel Valve; available in a wide range of types.

Request complete catalog from:

**The FULFLO SPECIALTIES CO., Inc.**  
417 Fancy Ave. Blanchester, Ohio



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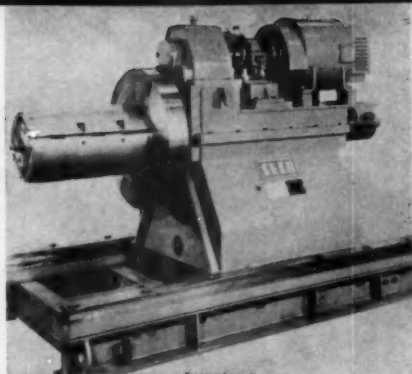
## UNCOILER WITH TENSION CONTROL

This Seco uncoiler can provide precisely controlled tension on light-gage slitting or processing lines, and features an enclosed, oil-tight gear drive and a drag-generator unit.

A hydraulic cylinder positions the uncoiler.

Steel Equipment Co., 20805 Aurora Rd., Cleveland 22, Ohio.

Use postpaid card. Circle No. 70



**DEBURR, CHAMFER, FACE  
MORE PARTS... FASTER...  
AT LESS COST!**



## On PINES Model 660 End Finishing Machine

Designed especially for simultaneous inside-outside deburring, chamfering and facing operations on tube, rod and pipe ends, this *high production* machine features:

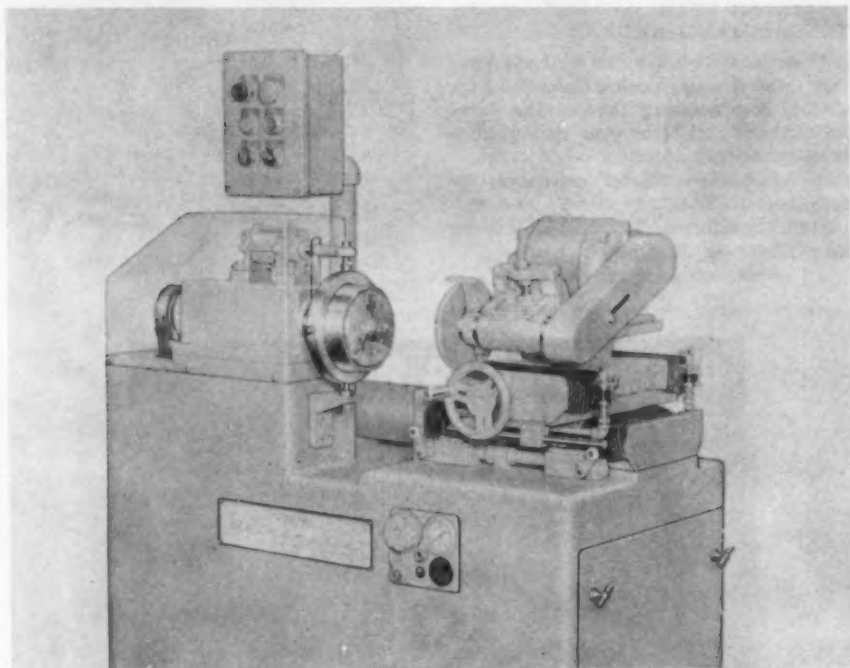
- EASIER OPERATION . . . with simplified controls.
- CLOSE TOLERANCE WORK AND FASTER FEEDS.
- 3-MINUTE CHANGEOVER . . . with interchangeable tooling and fast selection from 8 spindle speeds.
- HIGH PRODUCTION . . . to 1500 ends an hour in stock to 2" O.D.

BOTH MANUAL AND AIR OPERATED UNITS AVAILABLE  
LARGER MACHINES ACCOMMODATE STOCK SIZES TO 5" O.D.

WRITE FOR NEW  
FREE CATALOG

**PINES** ENGINEERING CO., INC.  
Specialists in Tube Fabricating Machinery 888 WALNUT • AURORA, ILLINOIS

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### PUT COMPONENTS TOGETHER TO BUILD CUSTOM GRINDER

The internal-external grinder shown here was designed to meet special requirements of an industrial component manufacturer. The machine also illustrates the versatility of Standard Electrical Tool's building-block line of spindles, grinder heads, slides, feeds and accessories.

The grinding wheel head is powered by a  $\frac{1}{2}$  hp motor and permits rapid

interchange of the 6" wheel external spindle for an internal spindle.

The head stock in this instance is equipped with collet chuck having an automatic air cylinder controlled by foot pedal switch.

Horizontal traverse is powered by a hydraulically controlled air cylinder.

The Standard Electrical Tool Co., 2486 River Rd., Cincinnati 4, Ohio.

Use postpaid card. Circle No. 71

### DIAMOND TOOL

Lazzara Co. in Houston has designed a diamond tool called the Block Diamond Wheel Dresser. Alternate layers of 21 and 22 diamonds set in tungsten powders are in the face for dressing the wheel. Face of the tool is  $\frac{1}{4}$ " x  $\frac{5}{8}$ ".

Lazzara Co., 112 Meyerland Plaza, Houston 35, Texas.

Use postpaid card. Circle No. 72

### LUBRICANT PUMPING SYSTEM

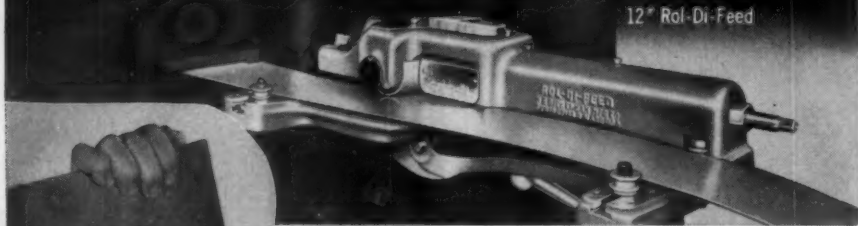
Constant-feed or re-circulating lubrication of bearings and journals on large machinery is provided by the Graymills pumping unit. It consists of a 5-gal. container and a gear-type pump driven by a  $\frac{1}{8}$  hp motor. Pressure relief-valve can be set to 75 psi.

Graymills Corp., 3705 N. Lincoln Ave., Chicago 13, Ill.

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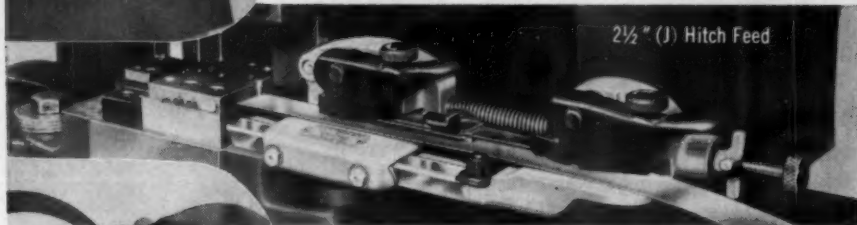
## Why Dickerman punch press feed users—

# Select the **TOUGH** feeds with the **TENDER** touch!



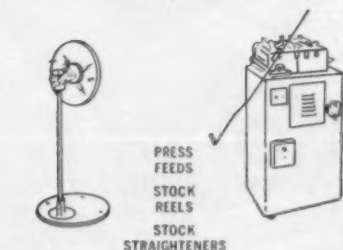
12" Rol-Di-Feed

Dependably feeds strip up to  $\frac{3}{16}$ " thick and 2 lbs. per linear foot.



2 1/2" (J) Hitch Feed

Efficiently feeds stock you can practically see through.



# Dickerman

H. E. DICKERMAN MFG. CO.

321-114 Albany Street • Springfield, Mass. Send for literature and prices

Use postpaid card. Circle No. 342

The Dickerman 2 1/2" Hitch Feed®, one of the bantams of the line, feeds stock as fine as 003". in thickness, in widths up to 2 1/2".

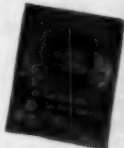
The Dickerman 12" Rol-Di-Feed, largest in the line, feeds stock up to  $\frac{3}{16}$ " thick and in any width up to 2 lbs. per linear foot.

There are 15 "standard" feeds in the complete, versatile Dickerman line.

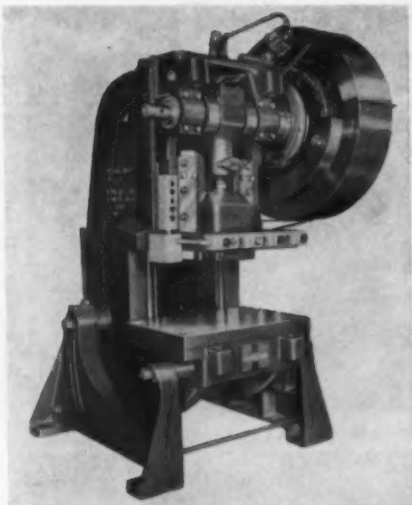
They all feed as fast as it is wise to run the tooling . . . and a hundred-million pieces, without major maintenance is routine.

You can gently feed a small fraction of an inch with a "Hitch Feed" or you can accurately position big, rugged strip stock up to 12" per press stroke with the Rol-Di-Feed.

Versatile, Dependable  
Production Savings are the reasons for specifying Dickerman Feeds.  
Prove it to yourself.



# 5 WAYS.....



## 55-TON PRESS-RITE PRESS

A power press which combines speed and versatility has been announced by Havar. Named the Model 55 Press-Rite, it features an extra-heavy and fast-operating ram slide with a long full V-ram to maintain precision alignment under loads. Full lubrication is insured whether the press is upright or inclined. Other features include an air-friction clutch, non-repeat single-stroke safety mechanism, and automatic cam actuated brake.

Havar Mfg. Co., 444 Cleveland Ave., St. Paul, Minn.

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## DRILLING AND TAPPING HEAD

Only 32" long, 10-15/16" wide, and 22 1/2" high, this unit is used for multiple-station arrangements on fixed and indexing tables. It has a 6" maximum spindle travel, and built-in electrical relays for automatic or manual cycling. Each unit is provided with a control panel, and takes up to a 10-hp motor.

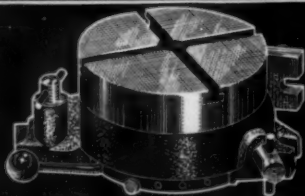
Johnson Drill Head Co., Rockford, Ill.

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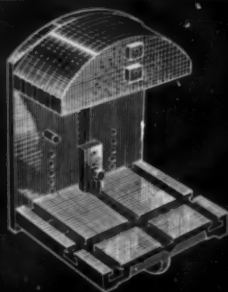
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3-WAY VISES  
FOR ALL ANGLE MACHINING



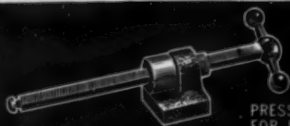
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FOR FAST PRECISION INDEXING



ADJUSTABLE LATHE FIXTURES  
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QUICK ACTING VISES  
FOR TOUGH OPERATIONS



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FOR JIGS AND FIXTURES

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Oakland Supply Corp.,  
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**wind your own springs  
FAST, EASY, ACCURATE**

- Winds one or hundreds of any spring
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- Forms any gauge wire to  $\frac{1}{8}$ " diameter
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See your Di-Acro dealer or write for information and prices.

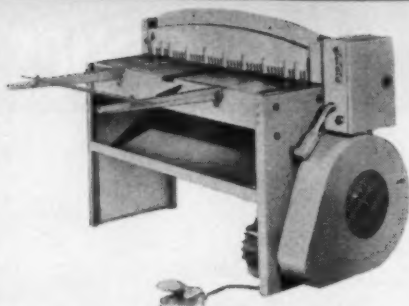


pronounced "die-ack-ro"

**DI-ACRO CORPORATION**

formerly O'Neil-Irwin Mfg. Co.  
604 W. Eighth Ave. • Lake City, Minn.

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## **INCLINED RAM POWER SHEAR HAS SPLIT-SECOND CYCLING**

Cutting action that takes place in one-fifth of a second is featured on a No. 48 high-speed power shear introduced by O'Neil Irwin Mfg. Co. It can cut ferrous and nonferrous material up to 50" wide and as heavy as 16 gage mild steel at a rate of 160 spm. The speed of the machine makes it adaptable for use on conveyor or run-out lines.

Di-Acro Corp., Lake City, Minn.

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## **MACHINE PRODUCTS PRECISION EQUIPMENT**

- **INCREASES ACCURACY**
- **REDUCES REJECTS**
- **SPEEDS SETUPS**
- **CUTS COSTS**

You'll hold closer tolerances and increase efficiency, too, when you use Machine Products precision surfaces. Because the combination of superior materials, skilled craftsmanship and rigid quality controls in the manufacture of Machine Products equipment assures you of the precise dimensional accuracies you require. A complete line of plates and accessories is available, so send for your free catalog today.



## **MACHINE PRODUCTS CORPORATION**

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### THREE- AND FOUR-WAY AIR VALVES

Bimba Mfg. Co. is marketing three- and four-way air valves with full  $\frac{1}{8}$ " ports. These valves contain  $\frac{1}{8}$  NPT air connects. They are base-mounted and 1-13/16" high. The three-way valve is designed to be used with single-acting air cylinders, while the four-way valve operates with the double-acting cylinders.

Bimba Mfg. Co., 101 Main St., Monee, Illinois.

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## M-B PNEUMATIC GRINDERS



Model M-CR-B



Model U-TR



Model HD-CR

Outstanding, powerful, fast-cutting tools of proven high efficiency. Designed for tough jobs and real production. Perform indefinitely and dependably. Precision made. Steel housing for safety. Also other models.

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DETROIT 3, MICHIGAN

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### LOAD-INDICATING PLIERS

An industrial plier which permits repeated application of a predetermined clamping force, regardless of the work thickness, has been announced by Lapeer. It is available in four models as well as a C-clamp series which has

a maximum clamping force of 1,200 lbs. The adjusting spindle is set for the desired force by trial clamping. Duplication of an established clamping force on any other work thickness can be made by turning the adjusting spindle so that only the load indicating washer moves after clamping.

General Sales Offices, Lapeer Mfg. Co., 1150 Baltimore W., Detroit 2, Mich.

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### HARIG FAST-ACTION VISES FOR PRODUCTION ... MACHINE SHOP



Adjustable production vise. After Jaw is set in position, hundreds—thousands—millions of pieces may be run off with a mere flip of a lever.

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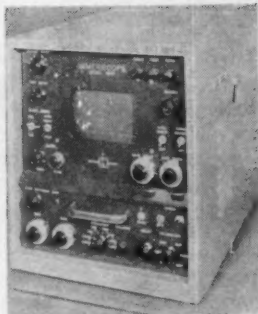
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## NEW ULTRASONIC TESTING INSTRUMENT

A Model 424D Immerscope has been designed for ultrasonic nondestructive testing of plates, ingots, pipes, tubing, forgings, castings, and welds. Inspection is not limited to metal objects, since other reasonably elastic materials such as glass, hard rubber, and ceramics can also be inspected.

Princeton Division, Curtiss-Wright Corp., P.O. Box 110, Princeton, N.J.

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# TORIT



**Torit Cyclone Separator Model.** High efficiency collection of all types of dust, chips and shavings. Up to 95% of the dust is removed from the air, drawn into the top of cone by centrifugal force, and settled to the dust reservoir below. Clean air is exhausted outside the building or indoors through after filters.

Self contained, compact, portable steel units. End mounted motor and blower mounted in free air for cool operation, is detachable for servicing or relocation of outlet. Cones can be rotated for proper inlet location. Dust reservoir has pull-out drawer for easy cleaning. Individual capacities range up to 6500 cubic feet per minute. Larger units are built on special order.

Prices start at \$335.

## DUST COLLECTORS STOP LOSSES CAUSED BY DUST

- *machine wear*
- *absenteeism*
- *product damage*

With a Torit Dust Collector, machines stay clean, hold close tolerance up to 80% longer. Dust is kept off bedways, slides, and bearing surfaces. There are fewer accidents because work areas are clean and safe. Employees work more efficiently in clean air, their health protected. And there is no dust in the air to harm fine product finishes.

\* For a FREE handbook detailing specifications and performance data of Torit Dust Collectors and applications, write Dept. 630.

**TORIT**  
**MANUFACTURING CO.**

1133 Rankin St. • St. Paul 16, Minn.

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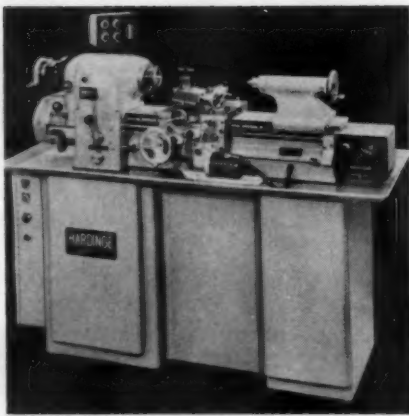
## HIGH SPEED PRECISION LATHE

The new improved Model HLV-H high speed precision lathe combines all the good features of the HLV series, plus many new ones. The lathe is designed to fill the gap between the plain precision bench lathe and the heavy duty engine lathe.

Lathe has an 11" swing over the bed, infinitely variable speeds of 125 to 3000 rpm, with push button controlled electrically actuated variable speed drive.

The larger headstock frame and large super-precision preloaded ball bearings provide maximum precision for sustaining operation at full speed. The headstock spindle has a through collet capacity of 1-1/16", and step chuck capacity of 6".

Built-in automatic thread length control and quick-acting compound slide for threading are standard equipment. The lead screw is used for threading only, as a separate electric motor provides the feed for carriage and cross



Built-in automatic thread length control and quick-acting compound slide for threading are standard equipment.

slide. Feed rates are easily changed by simply turning a knob on control box at right-hand end of bed.

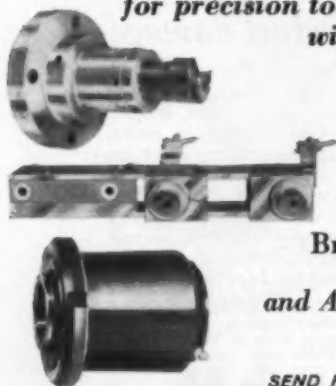
Hardinge Brothers, Inc., Elmira, N.Y.

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*for precision tools requiring split-tenth adjustments  
without loosening or tightening screws*

Precision Boring and Turning Tools  
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Diamond Dressing Arm  
Another special application using the  
Briney Principle of Precision Adjustment

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## **BRINEY MFG. CO.**

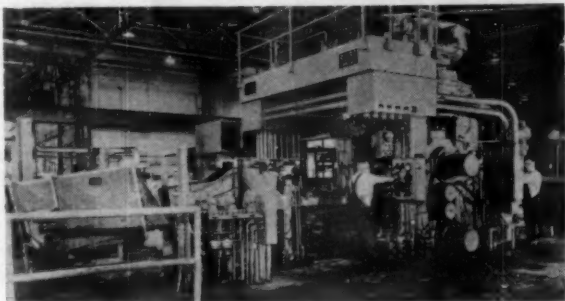
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P.O. Box 208  
Pontiac, Michigan  
Phone: FEderal 4-2552

## BREAKDOWN MILL ROLLS FERROUS AND NON-FERROUS STRIP

A new addition to the Western Electric Co.'s Hawthorne Works in Chicago, where Bell System dial telephone equipment is manufactured, is a new Bliss breakdown mill which converts slabs into strip. At Hawthorne, Western Electric casts its own alloys and then rolls them into strip, using some 30 million pounds of ferrous and non-ferrous metals and alloys every year. Among the metals handled are brass, nickel, silver, phosphor bronze and the special ferrous material, Permalloy.

Bliss' slab and coil handling auxiliaries include a 50' entry table, air-



13" x 27" x 18" cold breakdown mill.

operated pivot type upender, coil box entry belt conveyor, etc. The equipment handles 500-lb. slabs and 2000-lb. coils. The mill can roll strip as fine as .060".

E. W. Bliss Co., Rolling Mill Division, Salem, Ohio.

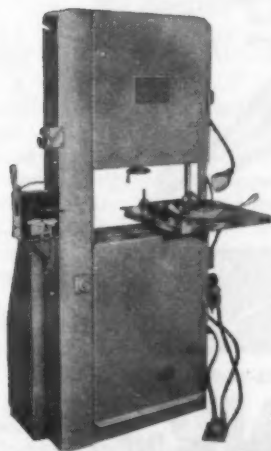
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Can Save YOU  
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*Connecticut*

friction BAND SAWS  
offer these advantages:



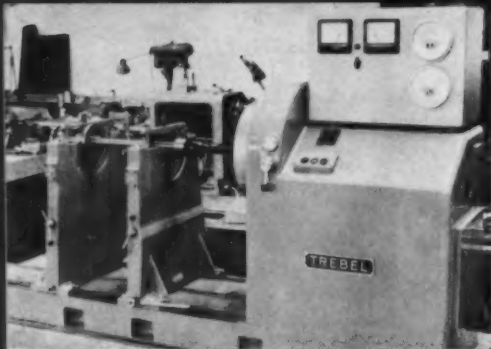
- Conventional saw cutting and friction cutting on the same machine.
- Especially valuable to fabricators of stainless steel and tough, heat resistant, materials.
- Better guides, more accurate cutting, longer blade life.
- Reasonably priced, selected features tailored to your requirements.

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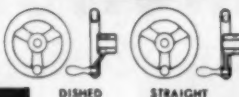
## BALANCER GIVES READINGS WITHOUT TRIAL RUNS

A force-measuring balance machine, which automatically indicates the amount of unbalance in a workpiece and the exact angular location without the need of trial calibrations, runs, or test weights, has been introduced by American Trebel.

The centrifugal forces which are exerted by the unbalanced workpiece

## Big Job, Little Job BALCRANK CAN HANDLE IT! HAND WHEELS

Best quality, fine grain cast iron. Rim and handles polished to high luster. Handles are revolving, solid or omitted. Available in standard sizes 4" to 12" dia. with plating, broaching or other machining to your specification.



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Revolving handles turn on HARDENED steel spindle with permanent graphite grease lubrication permitting FASTER, EASIER adjustment by user. Machined from quality BAR STEEL ground and POLISHED to a smooth, high luster.



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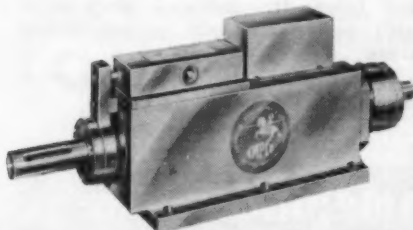
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are measured directly by a pressure-sensitive transducer, and thereby eliminates the need of converting the unbalance force into vibrations before measurement.

Equally suitable for piece work as well as for production runs, the Trebel Model F may be operated by relatively unskilled personnel. No set-up calibrations are required on this balancer and the operator can shift from one type of work to another without the need of calibration charts or a set-up man.

American Trebel Division, Kurt Orban Co., Inc., 87 Greenwich Ave., Greenwich, Conn.

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#### EMPCO HAS HYDRAULIC FEEDER

A hydraulic feed unit for simplified control of complex machining operations has been announced by Enterprise Corp. This attachment operates independently or in conjunction with other hydraulic equipment such as clamps, indexing mechanisms, or other feeders. It has a flexible range of operational cycles, and can be used in a variety of production operations including reaming, counterboring, grooving, and tapping.

According to the company, the new hydraulic unit sets up easily, and bearings, seals, piston rings, cylinder sleeves, and other components are readily replaceable.

Enterprise Machine-Parts Corp., 2732 Jerome St., Detroit 12, Mich.

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## KENTRALL Hardness Testers Are Motorized

By removing major test loads automatically, the new motorized Kentralls reduce operator error, increase reproducibility of test results, and raise the productive capacity of the machine—for the same price as hand operated testers.

The motorized Kentralls are available in Combination Testers which provide both Regular and Superficial Rockwell Hardness Testing in a single machine. For those applications that do not require the additional range, Kentrall also makes single purpose testers for either Regular or Superficial testing alone.

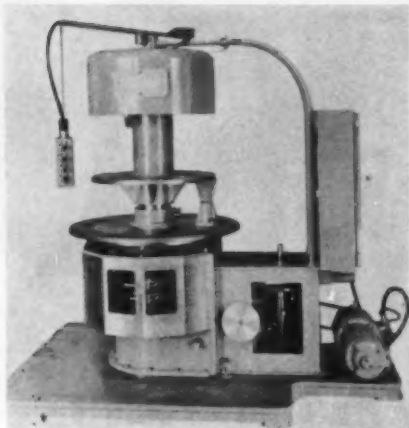
For complete information write for Bulletin CR5-60.

**KENTRALL**  
THE TORSION BALANCE COMPANY  
Main Office and Factory:  
CLIFTON, NEW JERSEY

TB-164

Sales Offices: Chi., Ill., San Mateo, Cal.

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### ASSEMBLY MACHINE DIRECTED FROM ONE CAMSHAFT

The Bodine Corp. announces the addition of a Model 60 assembly machine to its line of dial type multiple

operation machines. The Model 60 combines the 360° of tooling availability, made possible by the center column construction, with mechanical actuation.

The indexing and tooling motions are all controlled from one central camshaft. Power pick-offs from the central camshaft provide auxiliary camshafts and sprockets to actuate tooling all timed directly with the main camshaft.

The Model 60 is suited for the assembly of a large number of components combined with the "in-process" inspection of the assembly, stage by stage. Coining, staking, crimping and inserting operations are performed from the moving tooling platform without any auxiliary power source. Tooling can be mounted inside, outside, above and below the indexing work table with power take-offs in all tooling areas.

The Bodine Corp., 317 Mountain Grove St., Bridgeport 5, Conn.

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to stamp metal products

Hand or Press Style. Type can be easily, quickly loaded and unloaded. Simplest construction . . . just a sturdy pin holds the type securely. No screws nor springs. Super-quality steel type made in various sizes: 1/32" up to 1/2" figures and letters. Write for Bulletin BB-23H.

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Indexed Sectional Type Box with separate compartment for each character. Two sizes for small and large type. We can also make steel type with round face characters.

**NUMBERALL STAMP & TOOL CO.**  
HUGENOT PARK STATEN ISLAND 12, N. Y.

STEEL  
TYPE

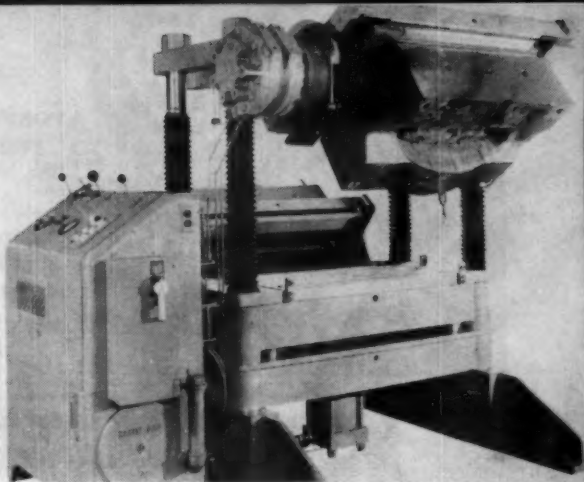


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## **SPEEDING SPOTTING-IN TIME**

Spotting-in time on dies and molds now can be safely speeded up to 70% with the Tilt-A-Die, according to its manufacturer, Sanders Tool and Production Co. Its rising and lowering bed and platen design eliminates damage to dies and molds caused by mechanical failure, which may occur from a vertically falling crown and upper platen. More than one person can work on spotting-in at the same time. Tilt-A-Die is designed for die casting, trim, blanking, form, and drop forge dies; and glass and plastic-mold spotting-in operations.

It can also be used as a heavy-duty



arbor press; a piercing, blanking, forming press; a production trim press; or a tryout press for trim dies.

Sanders Tool and Production Co.,  
4030 Fitch Rd., Toledo 13, Ohio.

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## **Perfect Alignment! Maximum Accuracy!**

**Your guarantee when you order**

### **ROOFE HEAVY-DUTY BULL NOSE Centers**

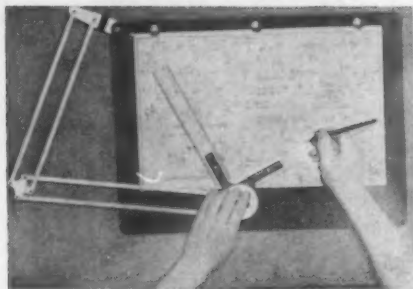
Make sure your next Heavy-Duty Centers are ROOFE "Bull Nose." *Two double rows of bearings* in the large and small ends of the nose allow perfect positive alignment on any type of work. *Two shank sizes provide diameters from 1/2" to 7 1/2"* for a wide range of work with a single center. Write today for catalog.



**HOUSTON GRINDING & MFG. CO., Inc.**

P. O. BOX 7461 • HOUSTON 8, TEXAS

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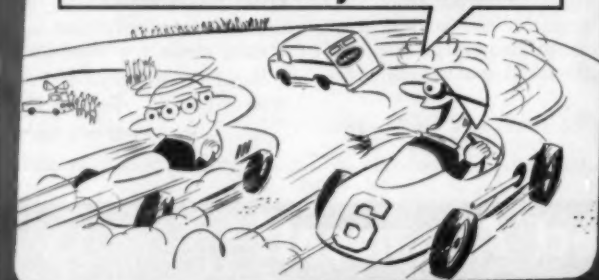
#### PORTABLE DRAFTING MACHINE

Drafto has added Model 112M to its line of portable drafting machines for 12" by 18" drawing sheets. The complete machine consists of a board, parallel arm assembly, and protractor with scales.

Drafting Equipment Co., 540 Randolph St., Meadville, Pa.

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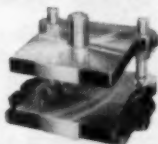
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Nobody, but nobody, tends your die set needs with such dispatch as Danly. Whether you want a new Precision Pilot Guide Post for extra ease in die set assembly . . . or a fast order placed for a special die set, you can depend on your nearby Danly man for quick, effective action. Like all 23 Danly branches and distributor assembly plants, he stocks a wide selection of die sets and diemakers' supplies for immediate delivery. Next time you need die set service, call your Danly man. He's as close as your phone — and at your service 'round the clock.



**NEW INSULATED** Dismountable Bushings, designed for use in machining mounted dies by electrical discharge, are fully described in new, fact-filled bulletin. Write for your copy.



PRECISION PRESSES, DIE SETS AND DIEMAKERS' SUPPLIES

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DANLY MACHINE SPECIALTIES, INC.  
2100 South Laramie Ave., Chicago 50, Illinois

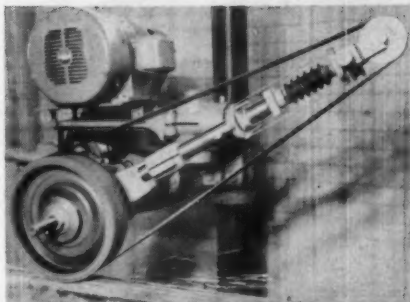
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## POLISHING ARM FOR BUFFING LATHES

An arm that can be installed on adjustable buffing lathes adapts them to abrasive-belt polishing operations. This lightweight attachment can be mounted on the spindle housing. Belts are spring-loaded between a contact wheel and an idler pulley.

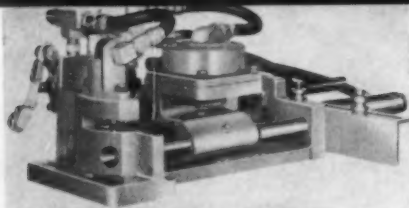
Acme Mfg. Co., 140 E. Nine Mile Rd.,  
Detroit 20, Michigan.

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 <h3>Severance ELECTRODE DRESSING CUTTERS</h3> <p>Used by many to re-condition Electrodes without removing from machines—</p> <p><b>Down-time is Slashed!</b></p> <p><b>Production is Increased!</b></p> <p><i>Designed to fit most all popular Electrode Dresser power tools. Special shapes quickly made up.</i></p> <p><b>INVESTIGATE!</b></p> <p><b>It may pay you much!</b></p> <p>ASK FOR MORE INFORMATION TODAY!</p> 			<h4>MIDGET MILLS</h4> 
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			<h4>BALL SEAT REAMERS</h4> 
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<h4>INSIDE DEBURRING CUTTERS</h4> 	<h4>OUTSIDE DEBURRING CUTTERS</h4> 	<h4>TUBE END DEBURRING CUTTERS</h4> 	<h4>CARBIDE HAND FILES</h4> 
<h4>HAND DEBURRING CUTTERS</h4> 	<h4>DISC CUTTERS</h4> 	<h4>DRILL COUNTERSINKS</h4> 	<h4>SPECIAL CUTTERS</h4> 
<h3>Severance TOOL INDUSTRIES INC.</h3> <p><b>722 IOWA AVENUE SAGINAW, MICHIGAN</b></p>			<h4>REGRINDING SERVICE</h4> 

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#### FEEDER FOR LIGHT COILS

A Ses-Matic Junior air feed has been designed to feed light coiled material into punch presses at speeds up to 250 spm with a positioning accuracy of .002".

This feed can handle materials 4" wide and .060" thick. Stroke lengths can be adjusted 4". No adjustment is necessary for stock thickness.

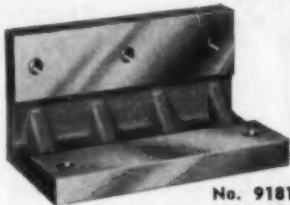
The Junior can be mounted to a press to feed material from any direction. It can be moved from press to press in a matter of minutes.

Ses-Matic Press Equipment, division of Special Engineering Services, Inc., 7631 Wyoming, Dearborn, Mich.

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No. 9180 Toolmaker's Knee, 3" x 2 1/2" x 4"



No. 9181-20 Duplex Angle Iron, 12" x 6" x 6"



No. 9192 Universal Right Angle Iron, 3" x 4 1/2" x 8"



No. 9201 Measuring Iron, 6" x 2 1/2" x 12 1/2"

## ANGLE IRONS

with **6** precise  
Working Faces

All faces are precision ground square or parallel within *tenths*. Clamp work to any face for multiple machining and inspection set-ups without relocating work. Add locating pins, stops, keyways, clamps and you have quickly-built special work staging fixtures.

Complete range of standard sizes available from stock. Special extra-large sizes to order from stock patterns. Write for Catalog 511.

**TAKE IT TO TAFT-PEIRCE**



7 MECHANIC AVENUE, WOONSOCKET, RHODE ISLAND

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## PARTS FEEDER

This Elk-O-Matic vibratory parts feeder for oriented position feeding has an instantaneous rate-of-flow control, and is designed to give maximum part delivery. The vibrations prevent production interruptions by keeping an oriented line of parts ready for discharge.

Elk Engineering Works, St. Marys, Pennsylvania.

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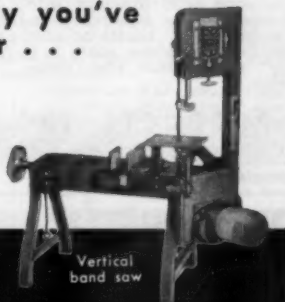
## The New WELLS MODEL 58-B

### A CONVERTIBLE BAND SAW

with the capacity you've  
been looking for . . .



Horizontal  
cut-off saw



Vertical  
band saw

### COMPACTLY BUILT • MODESTLY PRICED

Here's the all new Wells Model 58-B . . . a metal saw designed and built for double duty—double value. It's a compact, rugged, well guarded, extremely versatile unit . . . economically priced. As a horizontal cut-off saw, Model 58-B features quick-action vise (swivels to 45°); automatic shut-off; adjustable guides. Capacity: 6" x 10" rectangular shapes; 6" dia. rounds. For vertical use, swing head to upright position and install work table. Optional wheel-handle unit provides complete mobility. Write for complete information.



*The Pioneers of Horizontal*

**METAL CUTTING  
BAND SAWS**

**WELLS MANUFACTURING CORPORATION**

707 Coolidge Ave., Three Rivers, Mich.

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## REPLACE SOLID BUSHINGS with JERGENS ADJUSTABLE BEARINGS



Cutaway View

### JERGENS "LIVE" BUSHINGS

- Increase Speeds, Feeds, 200%
- Reduce Tool Breakage
- Eliminate Bushing Wear
- Use Economical Carbide Cutters
- Provide Greater Precision
- Available for  $\frac{1}{2}$ " to  $6\frac{1}{2}$ " Shafts
- Will stand greater sidewall pressures

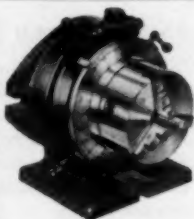
Get time, tool, and money-saving advantages by replacing solid bushings with Jergens adjustable roller bearing units. Available for  $\frac{1}{2}$ " to 6" shafts or with straight roller bearings where space is a factor in  $\frac{1}{2}$ " to 2" shaft size. Write for information.

### DONLEY PRODUCTS, INC.

Dept. MT-4 • 11106 Avon Ave. • Cleveland 5, Ohio

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## HIGH-PRECISION Indexing & Holding Fixtures

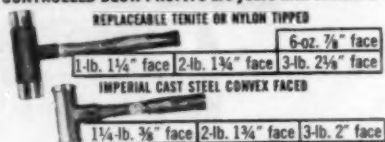


**ELISHA PENNIMAN**

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## Supply your machinists with TAHLEN NO-BOUNCE HAMMERS CONTROLLED BLOW PROFITS are yours with TAHLENS



WRITE for folder, prices and nearest Distributor

Dept. M-4 **TAHLEN HAMMER CO.**

1729 1st South, Seattle 4, Washington

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## IMPORTANCE OF CONTROLLED MICROSTRUCTURE

A consistent and uniform microstructure in a casting assures consistent and reproducible behavior from the standpoint of machinability. Castings having an abrasive outer skin, which may include oxide, minute imperfections, or surface decarbonization, cause rapid initial tool wear and reduce machining efficiency.

By specifying Meehanite metal, the production engineer can expect to obtain maximum life from cutting tools. The free machining qualities of Meehanite castings are the result of control in the process of manufacture and the achievement of structural uniformity in the finished casting.

For a free guide to machining Meehanite metal, write to: Meehanite Metal Corporation, 714 North Avenue, New Rochelle, New York.



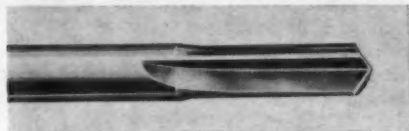
# MEEHANITE METAL

MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES.

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## SOLID CARBIDE DRILL FOR HIGH TENSILE ALLOYS

The Atrax Co. announces a series of solid carbide drills for heavy duty drilling of high tensile alloys and steels.



Known as the Series 1806 "Hi-Ten," the design features straight shanks, two straight flutes and right hand rotation. The drills will be available from stock in 29 fractional sizes from 1/16" to 1/2".

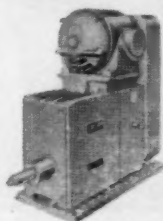
The manufacturer recommends the drills for drilling hardened steel up to 65 Rockwell C and for production applications on exotic metals, high tensile and high alloys through 56 Rockwell C.

The Atrax Co., Newington 11, Conn.

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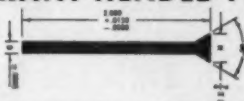
## DRILL FEED UNITS

for drilling, tapping, milling, boring. Cam, hydraulic, or lead screw. Many sizes, 1/2 to 15 hp. Avey Division, Motch & Merryweather Cincinnati 1, Ohio



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## DURANT HEADED PINS



All tool steel Rockwell C 58/60 — honed finish, no pickup — heads left soft and are guaranteed uniform. Attractively priced at \$12. to \$19. per C. We manufacture 103 and stock 103 sizes for immediate delivery.

Available through our distributor or order direct. Write for complete prices and details.

**DURANT TOOL CO.**  
17 THURBERS AVENUE  
PROVIDENCE 3, RHODE ISLAND

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## Reduce wheel dressing costs with

Victory Diamond Dressers are made of selected African diamonds, skillfully set by diamond tool craftsmen to eliminate breakage. Yet you will find our prices unusually low, enabling you to get two or more tools from us for the same price you now pay for one, in some cases.

### Victory Diamond Dresser Prices

Carat	1/4	1/3	1/2	3/4	1	1 1/2	2	2 1/2	3
Price	\$2.75	3.50	5.00	7.30	10.00	14.80	18.50	23.00	27.50

Stock sizes: 7/16 x 6; 3/8 x 6; 7/16 x 2; 3/8 x 2. No charge for other mountings.

### THIS MONTH'S SPECIAL

Reject Thread Grinder Diamonds For Many Different Uses In Any Shop.

1/4" x 1"; 1/4" x 1 1/4"; 3/8" x 1 1/4"; \$2.00 per tool. Six tools minimum order.

**VICTORY  
DIAMOND  
TOOL**

**COMPANY, Inc.**

Dept. M., P.O. Box 348, East Orange, N.J. — Tel. ORange 4-4874

Prompt resetting service. Export inquiries invited.

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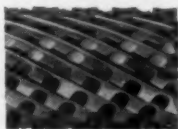
#### HIGH-SPEED PARTS FEEDER

This unit is used for feeding, orienting, and counting a large variety of objects at high speeds. Items such as washers, blanks, nuts, bushings, discs, and bearings can be handled at speeds up to 3000 parts per minute.

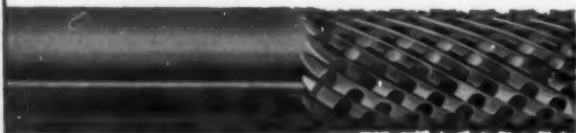
Count-O-Matic Inc., Division of U.S. Engineering Co., 40-24 22nd St., Long Island City 1, N.Y.

Use postpaid card. Circle No. 91

## DIXIE CARBIDE ROUT-O-MILLS



EFFICIENTLY ROUT, MILL AND TRIM THE  
HARDEST, MOST ABRASIVE **PLASTICS**



Custom designed Dixie Carbide Rout-O-Mills rout, mill and trim "hi-hard" plastics such as reinforced fibre-glass, melamine, Plexiglas, Epoxys and laminated plastics. Exclusive tooth designs provide much faster cutting speeds and considerably longer tool life.

Carbide Rout-O-Mills are available in  $\frac{1}{16}$  to  $1\frac{1}{2}$  inch diameters . . . and tooth designs in many contours are available. Send for Rout-O-Mill Bulletin.

Contact Dixie Tool Industries for machining and engineering assistance in plastics fabrication.

Complete Carbide Tool catalog available upon request.

**Dixie Tool Industries, Inc.**  
Bridgeport 2, Michigan.



100

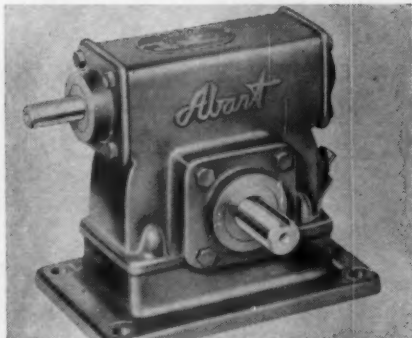
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## SPEED REDUCER HAS 100 TO 1 RATIO

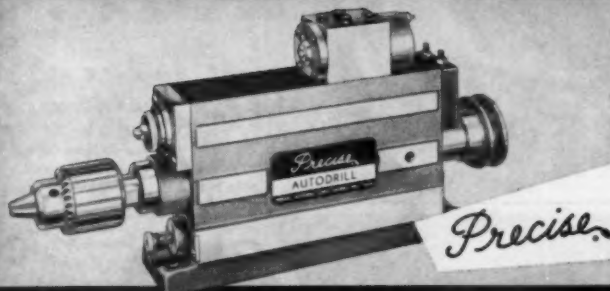
Abart now has a heavy-duty fractional horsepower speed reducer which will provide 100 to 1 ratio. Handling inputs of  $\frac{1}{4}$  to 2 hp. at 1800 rpm, and  $\frac{1}{6}$  to 1- $\frac{1}{2}$  hp at 1200 rpm, this unit has a right-angle drive and is fully enclosed when mounted in all positions. It can be furnished with input or output shafts projecting from either or both sides of the housing.

Abart Gear and Machine Co., 4834-36 W. 16th St., Chicago 50, Ill.

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## COMPACT . . . ONLY 2" WIDE! DRILLS $\frac{5}{16}$ " IN STEEL!



## PRECISE AUTODRILL

It takes little space (just 2" wide, 12" long, 7" high) — mounts in any vertical or horizontal position on 2-inch centers — has  $\frac{5}{16}$ " drilling capacity in steel! Precise Autodrill is a fully automatic drill unit with depth accuracy to .001". It's electrically operated, has air controlled advance and retract with continuously variable hydraulic feed. Maximum stroke is  $1\frac{1}{4}$ ". Spindle speeds range up to 6000 rpm. Compact, modular design permits single or multiple setups — an electric and pneumatic interlock is provided for automated setups. Two compact tapping heads are available — handle up to #10, and  $\frac{5}{16}$ " taps.

*Precise*

Grinder-Millers, Power Quills, Jig Grinders,  
Milling Machines, Automatic Drill Units,  
Cutting Tools, Vapor-Lub Cooling,  
Sklero Hardness Tester  
Quality and Precision Since 1882

### PRECISE AUTODRILL CORPORATION

3731 Blue River Road, Racine, Wisconsin, U.S.A.

Branch Plant: Precise, G. m. b. H., Duesseldorf, Germany

Franklin ads. P103

SPECIFY  
**Spraymist®**

**BIJUR ENGINEERED FOR  
PRECISION  
MIST CONTROL**



Only Spraymist provides these exclusive features

- Mist forms at the Jet Tip . . . not in the unit, preventing loss of coolant due to condensation—yielding high efficiency and economy in operation. Needle Valve at each jet tip conveniently controls uniform, continuous mist—from superfine to heavy spray permits multiple jet operation. Easily replaced jet tips.
- Compact Unit Design—Includes ALL necessary controls: Trap-Filters—Regulator—Gauge—Solenoid Valve—Reservoir.
- Automatic Operation—Mist starts and stops automatically as it is tied in the operation of your machine.
- Built to Last—Sturdy construction—Choice of 18 ounce, 1 gallon or 5 gallon units.

4219

Write today for Bulletin F-8.



**Bijur**

LUBRICATING CORPORATION  
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## INTERNAL CUTTING TOOLS

4 DISTINCTIVE STYLES  
IN CARBIDE & HSS

SIZES FROM  $\frac{1}{16}$ " UPWARD

Write for free complete catalog

**R. B. TOOL CO. INC.**

340 Maple Ave., Westbury, L. I., N. Y.  
EDgewood 3-1382



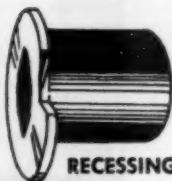
BORING



FACING



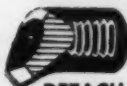
THREADING



RECESSING



SOLID SHANK TYPE



DETACHABLE HEAD TYPE

## BLACK GRANITE LAPPING PLATE

A noncontaminating hand lapping plate to produce finishes on nonferrous metals and nylon is now available from DoAll.

This plate has diameters of 12" or 18" and is 3" thick. Lapping surfaces have  $\frac{1}{8}$ " deep serrations spaced  $\frac{1}{2}$ " apart. According to the manufacturer, the advantages of such a plate are finer surface finish, better appearance, and elimination of the danger of a con-



taminator causing malfunctioning of the lapped part.

The DoAll Co., Des Plaines, Ill.  
Use postpaid card. Circle No. 93

## REPCO *Time-Saving Tools*

### ADJUSTABLE V-BLOCK DRILL JIG

**Saves Set-Up Time—  
Increases Output**

Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity #80 to  $\frac{1}{4}$ " diameter. Handles stock from  $\frac{1}{4}$ " to 2" diameter.

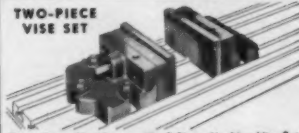


### TRUE-CENTER ADJUSTABLE TOOL HOLDER



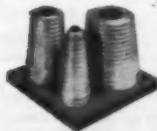
The REPCO Adjustable Holder is a precision-built tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as  $\frac{1}{8}$ " machine misalignment. Cuts down on tool wear, breakage, and scrap.

### TWO-PIECE VISE SET



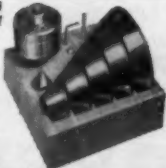
Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, or separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid. Two sizes 6" and 8".

### CHUCK JAW TRUING-RING SET



This Ring Set saves time, cut cost of boring jaws. With correct diameter rings at hand, you gain hours of productive time. Plated rings range from 1" to 4" by  $\frac{1}{8}$ " increments. Handy peg-type rack keeps rings in place.

### COMBINATION LIVE-CENTER SET



Heavy-duty live center plus six interchangeable adapters, ranging from a point to  $6\frac{1}{4}$ " dia. ball. Saves costly set-up and machining time necessary to make large-diameter centers. Straight and various taper shanks available.



Write for complete information—Exclusive agent territories open.

ROCKFORD ENGINEERED PRODUCTS CO.

2332—23rd Avenue • Rockford, Illinois

Use postpaid card. Circle No. 368



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### HEAVY-DUTY UTILITY VISES

A 640 line of utility vises has been designed specifically for rugged use, according to its manufacturer, Wilton Tool Co. No. 643½ has a jaw width of 3½", an opening of 4", and a jaw depth of 3". No. 645 has a jaw width of 5", an opening of 5½", and a jaw depth of 3¾".

Wilton Tool Mfg. Co., Inc., 9525 Irving Park Rd., Schiller Park, Ill.



## PRESSES

STRAIGHT-SIDE TYPE

with large die area  
capacities up to  
400 tons

AND

GAP  
TYPE  
PRESSES



*Complete recommendations for any job on request*



Press Brakes • Straight-Side-Type Presses • Press Brake Dies

Hand and Power Bending Brakes • Special Metal-Forming Machines

## DREIS & KRUMP MANUFACTURING CO.

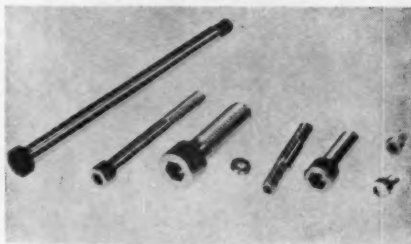
7440 South Loomis Boulevard, Chicago 36, Illinois

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### HIGH-TEMPERATURE BOLT

Internal wrenching bolts for temperature applications to 1800° F. are now being produced by Mercury. They are made of high-temperature material, AMS 5735, 19-9DL, Inconel X, M-252, titanium, or other heat-resistant alloys. Heads are designed to accept standard Allen wrenches and can be supplied with drilled holes for lockwire installations.

Mercury Air Parts Co., Inc., 9310 W. Jefferson Blvd., Culver City, Calif.



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# NEW

## SPEEDLAP 12" LAP-GRINDER

### EXTRA BONUS features:

- Stainless Steel Construction
- 2-in-1 Reversible SPEEDALLOY Lap Plate
- Positive Flatness Control
- Rapid Foolproof Abrasive Change
- Ultra Quality — Production Engineered



**100% More Lapping Production Per Dollar**  
**Over 50% Greater Production Capacity**  
**30% Less Cost**

Write for Complete Descriptive Bulletin No. 461C



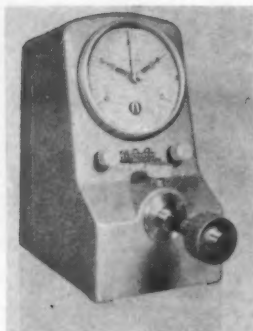
**SPEEDLAP CORPORATION**

3632 W. OAKTON STREET

SKOKIE, ILLINOIS

Phone: ORchard 6-1500





### STANDARD AIR GAGES

Standard Gage Co. has introduced a new line of air gages which have adjustable magnifications for 35:1 to 28,000:1, and a choice of twenty-six stock dials.

Standard Gage Co., Inc., Poughkeepsie, N.Y.

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### CAMS

Complete Facilities For  
CAM MILLING and  
CAM GRINDING

To Your Specifications



**C A M SERVICES CO.**

DIVISION OF  
**HIMOFF MACHINE CO.**

23-22 44th ROAD LONG ISLAND CITY, N.Y.

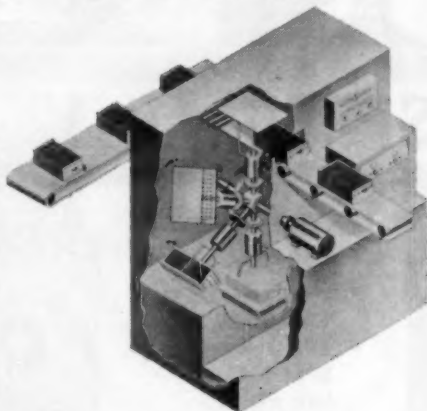
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### AUTOSONICS HAS AUTOMATIC TOTE-BOX CLEANER

A machine designed to automatically load, ultrasonically clean and degrease, dry, and unload tote-box loads of metal parts, has been announced by Autosonics, Inc. Called the AutoSonex V-72, it is particularly efficient for delicate assemblies and parts that cannot tolerate impingement or tumbling. Loads are immersed in a degreasing solution, rinsed with pure distillate spray and vapor, drained, and dried before discharging. The tote-box is cleaned at the same time as its contents.

Autosonics, Inc., 4217 Chestnut St., Philadelphia 4, Pa.

Use postpaid card. Circle No. 97



**Plain Type**

TRADE

**AUTOM**

MARK

**Offset Type**

## CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS  
OFFSET

**AUTO MOULDING  
& MFG. CO.**

**1110 E. 87TH ST.  
CHICAGO 19, ILL.**

Use postpaid card. Circle No. 383

### SPECIFICATIONS

Open width  $\frac{7}{8}$ " to 6"  
Gage Material .040 to .187"  
Pin Diameter .093" to  $\frac{1}{4}$ "  
Lengths to 120".

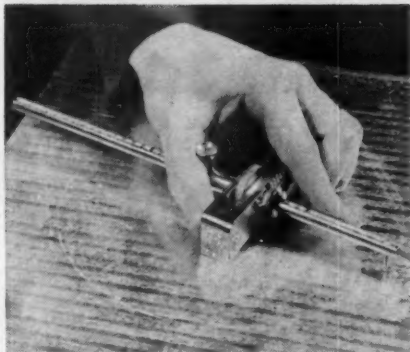
SEMI-OFFSET

### MARKING AND LAYOUT TOOL

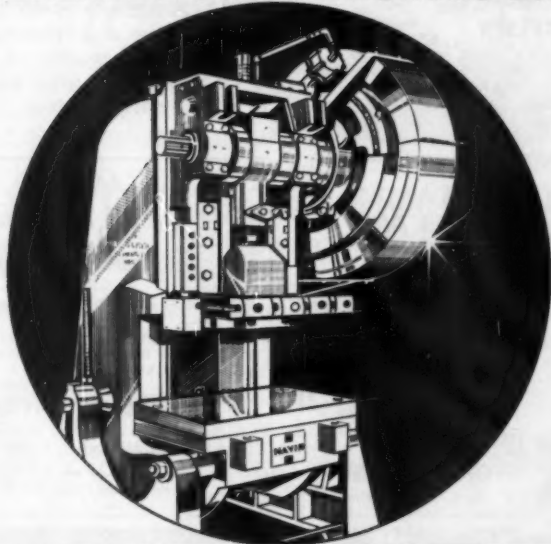
This Model 360 marking and layout tool was designed to scribe straight lines and circles on sheet metal and other flat surfaces. Marked rods, which fit into the main body, are interchangeable. They are slotted for  $\frac{1}{4}$ " measurements and finer spacings can be made with the adjusting wheel on the barrel.

Inventions Future, Inc., 918 Blackhawk Blvd., Rockton, Ill.

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## HAVIR 85 TON PRESS-RITE INCREASES OUTPUT...SAVES DIES



Havir 85 Ton OBI with *built-in* TIE RODS gives you additional frame strength for greater output.

Saves time and money because Tie Rods and Ram Rigidity minimize deflection . . . die life is increased by as much as 50%.

*Get the complete story on Havir's full line 2 to 85 tons. Write:*

**HAVIR MANUFACTURING CO.**  
438 Cleveland Ave. • St. Paul, Minnesota



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# Angle Tangent to Radius WHEEL DRESSING *Simplified*

**WITH  
ROTHFUSS TOOLS**



## THE G-5 RADIUS DRESSER

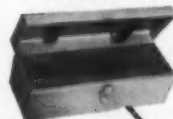
is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on all wheels up to 10" and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation.  
**Price \$80.50**



**Price \$87.50**

## THE G-2 ANGLE DRESSER AND TOOL HOLDER

is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up jobs to be milled, drilled, tapped on any desired angle.



**All for only  
\$149.50**

(including case  
and both tools  
with diamonds)

## FREE STORAGE CASE

of light-weight steel, with a hinged top, heavy duty latch and a blocked interior to insure the safety of the dressers when carried.

## OUR FIXTURES

will dress most radii and angles tangent each other, similar to those shown below.

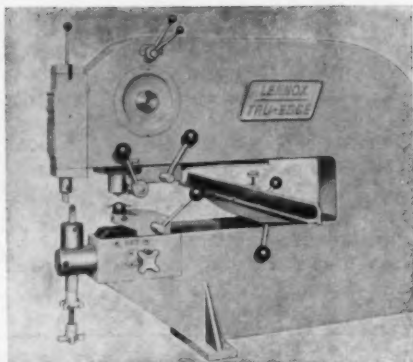
Distributorship available in select territories

**ROTHFUSS TOOL**  
COMPANY

BOX 2694 ELMWOOD STATION

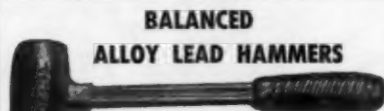
PROVIDENCE 7, R. I.

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## BENCH MODEL METLMASTR

Lennox has added a Bench Model TE-100 Metlmastr to its line of shearing, forming and piercing machines. Edge cutting capacity of the machine is up to 12 ga. in mild steel plate, and 16 ga. in stainless steel.



## BALANCED

## ALLOY LEAD HAMMERS

## HANDLES AND MOULDS

1, 1½, 2½ and 5 lb. sizes—order your alloy lead hammer requirements from your mill supply house.

or direct from:

## KITZMAN MFG. CO.

Manufacturers Of Lead Hammer Products  
15061 Hartwell Ave. Detroit 27, Mich.

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## INCREASED PRECISION . . .



Write  
for details and  
descriptive  
literature

Twist Drill Test Microscope

## W. VON ARNAUD CO.

95 Grove St.

Oakland, N.J.

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MACHINE and TOOL BLUE BOOK

The bench model has a variable stroke length that can be adjusted from .022" infinitely through .110" without stopping the 1/2 hp motor.

Strokes per minute, cutting from 1750 to 3500, are automatically regulated to material thickness when the operator sets the stroke pointer. It cuts from 8' to 15' of material per minute.

The manufacturer points out that all of the production and safety features of the firm's three larger floor models are built into the bench model.

Lennox Tool and Machine Builders, Div. of Lennox Industries, Inc., Lima, Ohio.

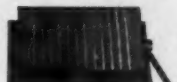
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### CUT-OFF MACHINES FEATURES INCREASED CAPACITY

A considerable increase in power and capacity over the previous model, plus a hollow arbor mist coolant and a retractable size gage are features of

### PERMANENT BRAND NEW MAGNETIC CHUCKS AT SENSATIONAL PRICES

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Size (inches)	Height (inches)	OUR PRICE	Dia. (inches)	OUR PRICE
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4 x 8	2 1/2	\$ 77.00	6	\$ 88.00
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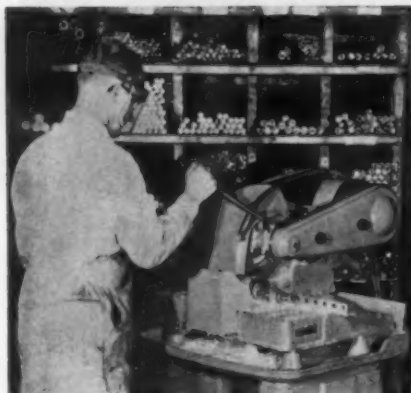


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CUTS, BENDS, PUNCHES

Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to 1/8" x 1 1/2" as illustrated, other models up to 1/2" x 8".

**J. A. RICHARDS CO.**  
KALAMAZOO, MICH.



Delta's latest swinging arbor 12" cut-off machine.

This model can handle 1½" diameter solid round bar steel on a production basis. The company reports its new cut-off unit will cut all bar stock and angles usually used in plant maintenance work.

The machine, with an abrasive wheel, can cut to a tolerance of less than .005", according to the manufacturer. This accuracy is achieved by a combination of power (5 hp) and surface speed (over 12,500 sfpm), plus a size gage that compensates for heat expansion created during cutting of ferrous pieces.

Rockwell Mfg. Co., Delta Power Tool Div., 486 N. Lexington Ave., Pittsburgh 8, Pennsylvania.

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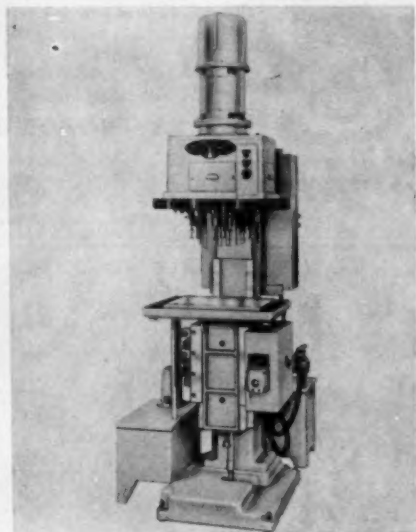
#### HIGH SPEED 14 SPINDLE TAPPER

A high speed multiple spindle tapping machine, capable of performing up to 60 cpm at 1600 rpm, has been announced by Precision Tool and Mfg. Known as the Deka • Drill No. HST-714, the machine is suited for automated type jigs and fixtures.

The 14 spindles are adjustable in any pattern within a head area of 7¾" x 12¼". A template cluster box with slip spindles can also be provided.

A specially built reversing motor, capable of 240 empty plug reversals a minute, drives the tapper.

The table is hydraulically operated, and can be set for various depths



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within a 6" stroke. The stroke can be held at the top of the cycle to permit manual lowering when desired. The table and knee assembly can be adjusted over a 14" distance.

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#### GRIND AND POLISH IN ONE OPERATION

A new portable abrasive belt grinder combines the backstand idler principle of abrasive grinding with power and portability for better grinding and finishing. Aro reports that the new tool grinds and finishes in one operation, because the abrasive belt method leaves a smooth, straight line finish, with no gouges or swirls left in the work to require further finishing. The belt runs at 7000 sfpm speeds. Resilient rubber contact wheel eliminates chattering even when working on rough surfaces.

Medium, hard or extra hard wheels are available.

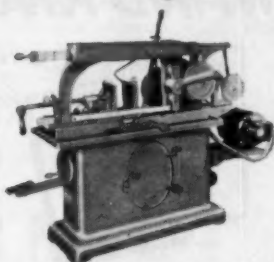
Aro Equipment Corp., Industrial Div., Bryan, Ohio.

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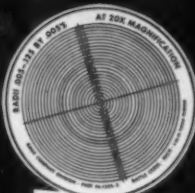
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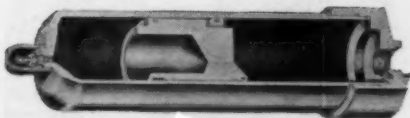
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|---|--|
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| <input type="checkbox"/> Short or narrow?   | <input type="checkbox"/> Remotely located?       |
| <input type="checkbox"/> Concave or convex? | <input type="checkbox"/> Of critical importance? |
- ☐ Measuring height and width of waves, bows, steps and other widely-spaced irregularities?
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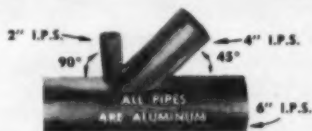
In less than 2 minutes?

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... and have both done in less than 4 minutes?

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You could have made all 3 joints shown  
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Phone me today!  
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My job is to make your  
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Or ... write for a sample.  
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# WALLACE

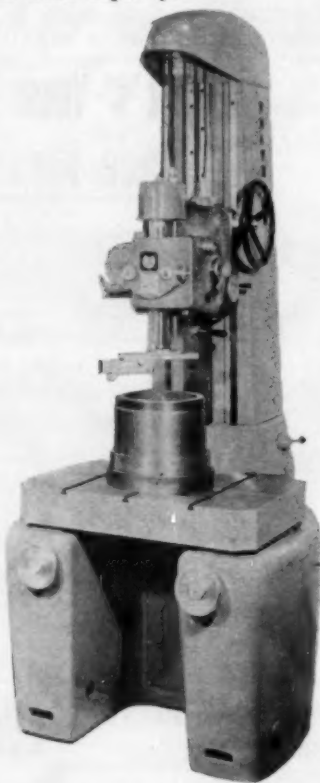
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## ROUNDNESS MEASURING INSTRUMENT HANDLES LARGE, HEAVY COMPONENTS

Talyrond's new Model 2 roundness measuring instrument has a work table designed to carry components weighing up to 1000 lbs. and shafts measuring up to 50". When necessary, the work table can be removed to provide additional work capacity.

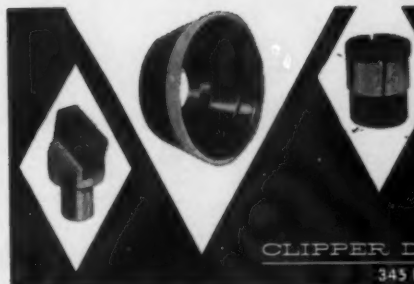


Measurements of roundness, concentricity, squareness and interrupted circular shapes are permanently recorded on an inkless polar chart.

Engis Equipment Co., Div. of Engr. and Scientific Instr., 431 S. Dearborn St., Chicago 5, Ill.

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MACHINE and TOOL BLUE BOOK



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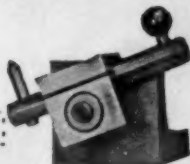
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Diamond always perfectly centered.  
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CAPACITY—1½" Convex to 4" concave

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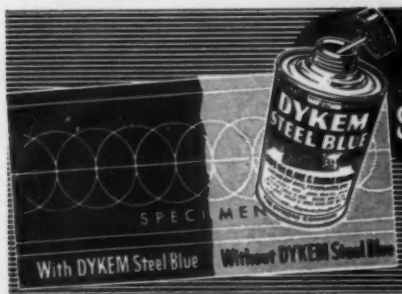
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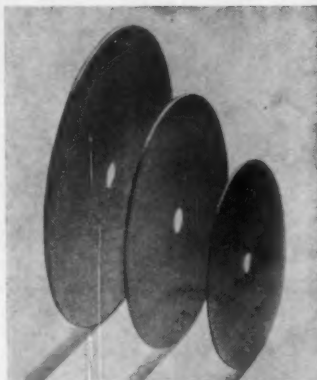
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A cut-off wheel that features cutting action on both sides as well as the face of the wheel is currently being manufactured by American Emery Wheel Works, Richmond Sq., P.O. 1475, Providence 1, R.I.

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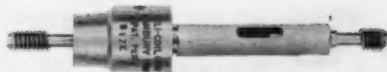
MACHINE and TOOL BLUE BOOK

### THREAD DEPTH GAGE HANDLE

A universal adjustable depth gage handle which permits gaging both size and depth of all drilled and tapped holes in one operation is being made by Heli-Coil Corp.

The adjustable handle feature provides economy of operation by dispensing with the need for grinding a step on the go-nib for each thread size and depth.

The adjustable handles are available



in four sizes and may be used with American Standard thread gages for measuring standard tapped holes, and with a pin gage for measuring drilled holes, in addition to the firm's line of thread gages.

Heli-Coil Corp., Shelter Rock Lane, Danbury, Conn.

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## Every shop needs a Shoplifter



Here is the economical way to transfer molds and dies, unload trucks, stack in narrow aisles, or raise parts and machinery to working level.

**The Shoplifter** is a compact, portable, easy to operate, lifter that will make the job easier for every man in your shop. And . . . it is quality built for years of dependable service with minimum maintenance.

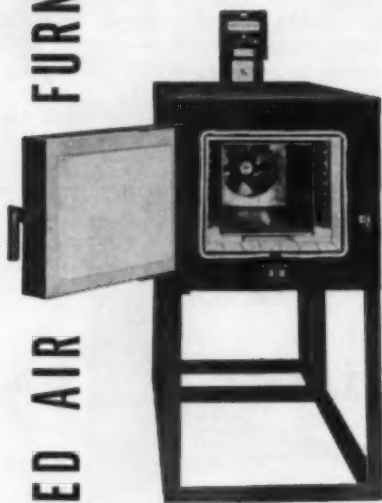
**New MARK II Shoplifter** has a capacity of 750 lbs., 54" platform lift, full control hoist unit, and complete safety features. Priced at only \$195.00 fob Chicago. Order your MARK II now for immediate delivery.

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**LUCIFER FURNACES, INC.**  
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Permanent identification of tools, machinery, and work is quickly provided with the portable electric Vibro-Graver. A carbide point writes at a speed of 7200 vibrations per minute. The unit is encased in plastic and has a control-wheel adjustment for fine, medium, or coarse strokes on metals, marble, tile, glass, plastics, leather, ceramics, and hard rubber.

Burgess Vibrocrafters, Inc., Commercial Products Division, Grayslake, Ill.

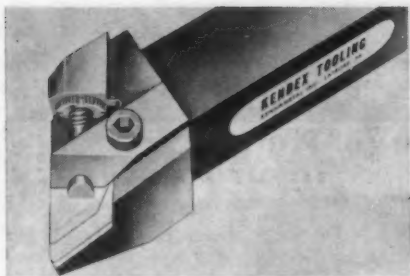


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## INSERT IS DOUBLE-LOCKED TO PREVENT PULL OUT

A profiling tool with double-locked carbide insert and a dial for adjustment of the chip breaker has been announced by Kennametal. Principal features of the tool are positive locking of the insert (1) against two walls of the tool recess by an eccentric or cam pin through a center hole in the insert, and (2) in its seat by a top clamp held by a socket head cap screw. The insert will not be pulled out while back facing or contouring.

New to this type of tool also is easy and precise adjustment of the chip

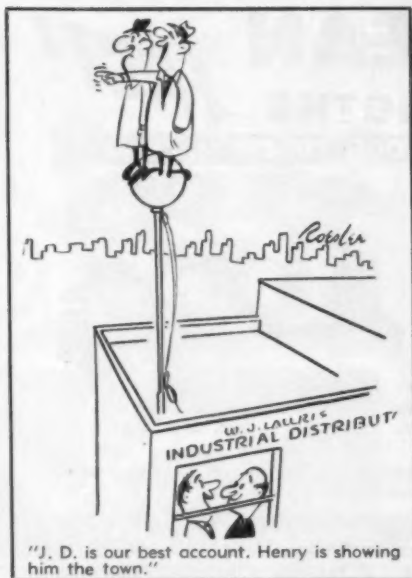


breaker with Kennametal's "Dial-A-Breaker." To simplify changing, indexing or inverting the insert, the chip breaker is raised by a spring plunger when the clamp is released.

Diamond-shaped inserts have a 55-deg. nose angle and are set in the holder at a 5-deg. negative side and back rake to provide four cutting points.

Three styles of holders that meet most machine tool requirements are available. Kennametal Inc., Lloyd Ave., Latrobe, Pa.

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April, 1961

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YOU CAN BUY . . .

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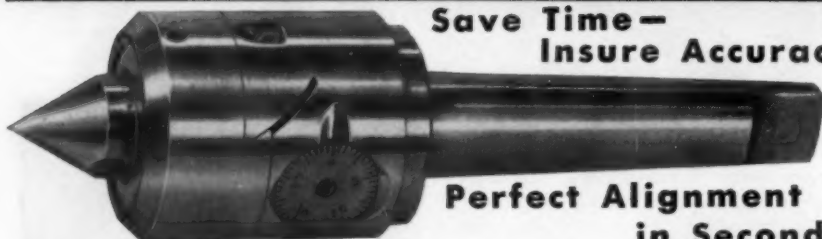
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**Save Time—  
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The introduction of the first live ball bearing center was a definite improvement over the old dead center. Now our added feature of adjustability further improves it and rounds out its usefulness.

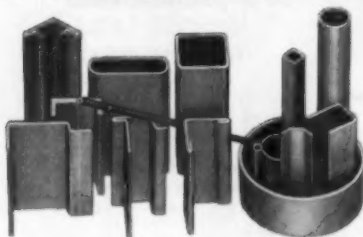
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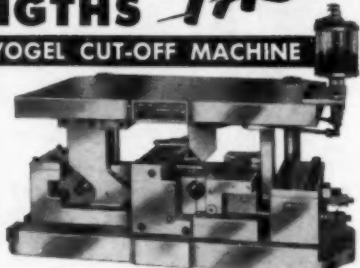
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# SHEARS CLEAN TO ACCURATE LENGTHS *FAST!*



**VOGEL CUT-OFF MACHINE**



With each press stroke, unit accurately cuts off tubing and shapes into lengths of  $\frac{1}{2}$ "  $\pm .010$ ", or more. The ends are cut clean with a minimum of burr or distortion . . . Shearing blades make thousands of cuts before resharpening.

No. 12 unit cuts up to  $\frac{3}{4}$ " O.D. x  $\frac{3}{32}$ " wall.  
No. 2 unit cuts up to 2" O.D. x  $\frac{1}{8}$ " wall.  
No. 3 unit cuts up to 3" O.D. x  $\frac{3}{16}$ " wall, or up to  $3\frac{1}{2}$ " O.D. x  $\frac{1}{8}$ " wall.  
Odd shapes handled in sizes equivalent to unit's O.D. capacity.

**V  
VOGEL TOOL & DIE CORPORATION**  
1827 NORTH 32ND AVENUE, STONE PARK, ILLINOIS

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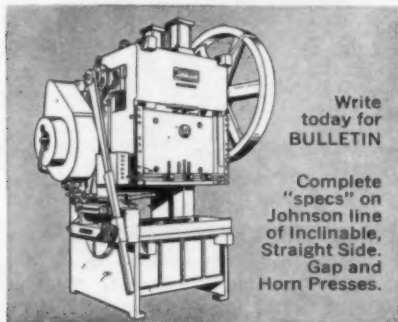
## REDESIGNED RADIAL DRILLS

Morris Machine has announced a price cut in its Mor-Speed line of heavy duty radial drills—now available for \$7,225. The machine has also been redesigned to incorporate the latest advances in machine tool design and engineering.

Providing 12 spindle speeds, 6 spindle feeds, and 12 inch spindle travel, the radials feature completely centralized controls, fully enclosed elevating mechanism, with electric column clamp, on 11" models and roller bearing mounted head. External electrical conduit has been eliminated, and column clamp control buttons are flush mounted as is a 110 volt accessory receptacle. Total vision lighting assures complete illumination of the workpiece and elimination of operator blind spots. A new positive displacement lubrication system provides maximum lubricating efficiency.

The Morris Machine Co., 2019 Eastern Ave., Cincinnati 2, Ohio.

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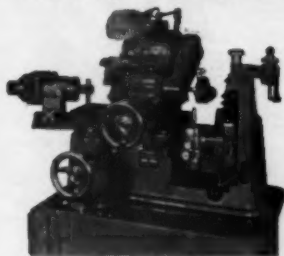


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Sharpens Chamfers, Flutes and Spiral Points



Model 1100

- Capacities No. 0 Machine Screw to 2½" Hand Taps.

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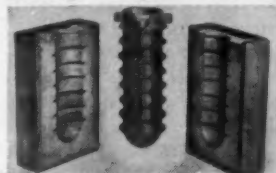
**HENRY P. BOGGIS COMPANY**

710 E. 163rd Street, Cleveland 10, Ohio

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*saves* TIME • LABOR • MONEY  
in chucking irregular workpieces



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designed and manufactured in the U.S.A.



### Gaertner 2" x 4" toolmaker's microscope for measurement to 0.0001" and 1 minute of arc

You'll find the Gaertner Toolmaker's Microscope as part of the standard inspection equipment in the ideally-equipped shop or lab. It will do the work of many single-purpose measuring and inspection instruments with greater convenience and accuracy.

Full 2" precision lead screws permit measurements over 2" x 2" of the instrument's range without the use of gage blocks or rods.

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Write for Bulletin 147-56

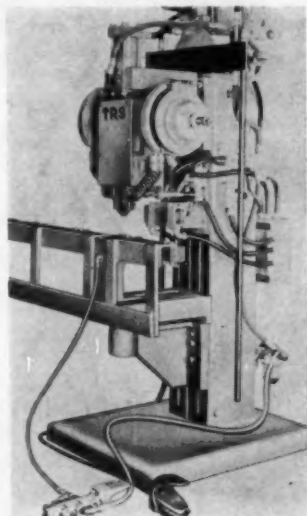
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### AIR-HYDRAULIC RIVETER CUTS COSTS, AVOIDS PUMP SPACE

This Model 211 riveter has a 12" throat depth and is designed to automatically feed and set either of two lengths of rivets up to 5/16" diameter. Operating on 80 psi air pressure, its hydraulic booster and cylinder (not shown) deliver a setting force of approximately 10,000 lbs. This force is applied only during the last downward 1/2" travel of the spindle. The first 3 1/2" of down stroke and the retract stroke uses low-pressure oil.



Selection of rivet length is done automatically when a section of the workpiece contacts a micro switch mounted on a work-support bracket. Air, controlled by a foot valve, raises the anvil pin and floats the rivet past obstructions.

Tubular Rivet & Stud Co., Quincy 70, Massachusetts.

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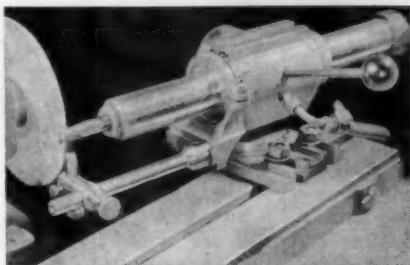
### END MILL SHARPENING FIXTURE'S SPINDLE FLOATS ON FILM OF AIR

Harig Mfg. Corp. has introduced a sensitive end-mill and milling cutter

sharpening fixture featuring a spindle that floats on less than a .00015" film of air.

The flow of air to the spindle inhibits the entrance of grinding dust. Its smooth action permits the sharpening of tiny tools as small as 1/32" up to 1 1/4" shank capacity. Milling cutter sharpening range is thru 6" diameter.

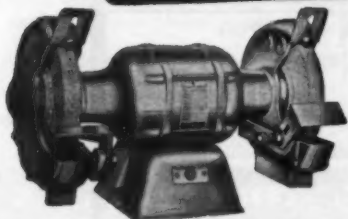
Other features include graduated swivel base, fine blade-rest adjustment, hard chromium inlay, indexes and components to grind tapered, as well as straight, end-mills.



Harig Mfg. Corp., 5757 W. Howard St., Chicago 31, Ill.

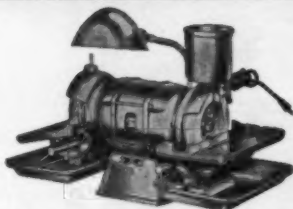
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Model 153-6". Reversible 1/2 HP motor, 3450 RPM. 1 1/2" wide wheels. Every part oversize for rugged, long-lasting use. Just \$201.80

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## MODEL 153-8"

Feature for feature, no other grinder offers so much for so little. Compare HP rating, wheel size, shaft diameter, bearing size with any other similar-type grinder. You'll quickly see why you get *more* with Baldor!

- Big 1/2 HP motor; won't burnout even if repeatedly overloaded!
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- Dynamically-balanced rotor—extra smooth operation!
- Exhaust-type guards!

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## DUAL TORQUE WRENCH

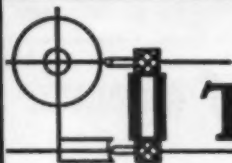
A Twin-Torq wrench offering two different torque limits without the need for dials or adjustment has been developed to meet the need for a single tool with dual purposes. The manufacturer claims it can make fast and positive inspection of torque tolerances

of previously tightened assemblies. It is equipped with two opposing drive tangs, and each torque value is set for a specific limit and sealed to prevent undetected tampering.

The wrench also permits accurate assembly of castellated nuts to facilitate cotter-pin and hole alignment without overstressing.

Jo-Line Tools, Inc., 8442 Otis St., South Gate, Calif.

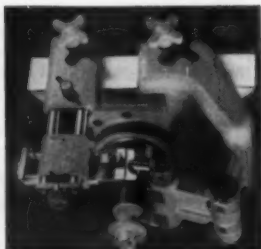
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# TRACAFORM

MODEL SMD-704

## NEW 1:1 Ratio SPINDLE MOUNTED CONTOUR WHEEL DRESSER



TRACAFORM solves your wheel dressing problems:

- Complex Shapes to "tenths" accuracy!
- Low in Cost (appr. 1/5 cost of other spindle-mounted dressers)
- High in performance and quality!
- Dresses wheels, from 7" dia. by 4" wide—down to the smallest diameter mounted wheel!

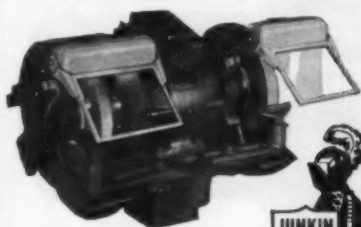
- Unnecessary to use costly lapped diamonds!
- Stylus easily ground to exact shape of diamond! Diamond wear easily corrected!
- Intricate forms can be dressed into the wheel repeatedly without losing location or disturbing work being ground.
- Fits most surface grinder spindles using 7" dia. or less grinding wheels!

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This new shatter-proof Electro-Lock Shield, due to its interlocked power and light circuits, will not permit a machine to be operated when the Shield is not in a full protective position.

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head rivets from smallest to 3/4" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindle.

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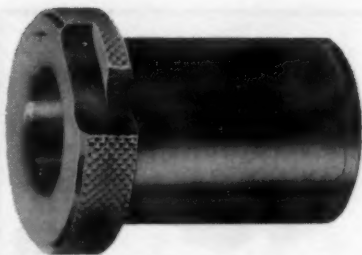


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#### AMERICAN DRILL BUSHING ADDS TUNGSTEN CARBIDE LINE

A complete line of tungsten carbide drill bushings has been announced by American Drill Bushing Co. The bushings have approximately 50 times the wear life of ordinary steel bushings, according to the company. Several types are available including head and headless press fit, fixed, and slip renewable. The complete line is available in a variety of American Standard sizes.

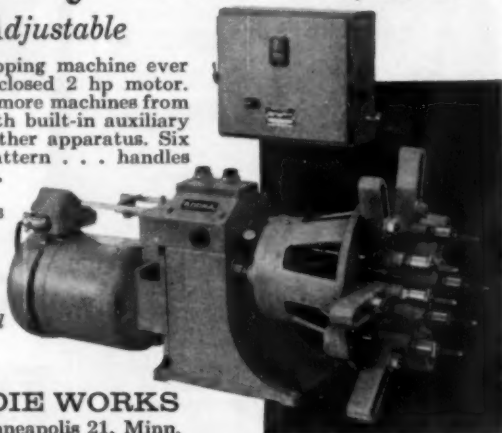
American Drill Bushing Co., 5107 Pacific Blvd., Los Angeles 58, Calif.

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## Capacity of six $\frac{3}{8}$ " taps... the new **ANOKA** Multiple lead screw tapping machine now yours for \$1,485

### Operate Any Position! Adjustable

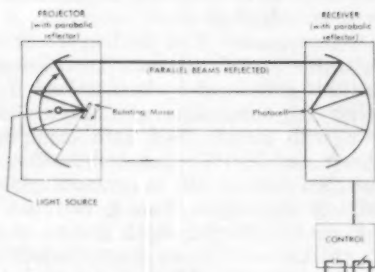
Highest capacity, most rugged tapping machine ever offered at this price! Powerful enclosed 2 hp motor. Operate in any position. Work 2 or more machines from different sides in one operation with built-in auxiliary switch, or work in clusters with other apparatus. Six spindles are adjustable to any pattern... handles 6 N.C.  $\frac{3}{8}$ " taps in free cutting steel. Special adaptors for mounting on drill press columns. Lead screws of fatigue-proof steel with tensile strength of 140,000 psi; Brinnell hardness of 280 Rockwell C. Min. stroke:  $\frac{3}{4}$ ", max.: 3". Precise depth control. Here's real high production massiveness! Shop-tested for 2 years on production runs.



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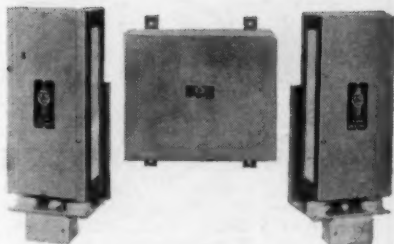
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## ROTATING MIRROR MODULATES LIGHT BEAM

These devices stop machines automatically when any part of a person's body enters a danger area. The units are designed for direct mounting on presses and other industrial equipment such as shears and brakes.

This "Curtain of Light" consists of a wide-beam modulated light projector, a photoelectric receiver, and a control unit. The projector and receiver can be mounted up to 15' apart. Highly sensitive to partial obstruction, the



control units operate when 2" or more of the light curtain is obstructed.

The Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio.

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## KNEE-TYPE GUN DRILL WITH CHOICE OF FEED UNITS

Designed to facilitate drilling deep holes in ferrous or non-ferrous materials, using carbide tipped drills, this knee-type gun drill is offered by Leland-Gifford Co., with either self-

Dial Index Feed as low as \$450.00  
Model BT-5  
3-Ton  
Punch Press  
\$109.50  
less motor—hub

Model BT-25  
25 Ton—\$1097.50  
less motor—hub

Model BT-12  
12 Ton  
\$437.50  
less motor—hub

Friction Roll Feed as low as—\$145.00  
Model B-2—2-Ton  
Punch Press  
\$87.50  
less motor—hub

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Economical  
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Hundreds of Different  
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contained hydraulic feed or lead screw  
 feed gun drilling unit.

Recommended for drilling accurate  
 holes up to 5/8" diameter by 7" deep,  
 the self-contained hydraulic feed unit  
 offers the advantages of uniform feed  
 rate with simple feed rate changing.  
 Pump and spindle are independently  
 powered with a 1 1/2 hp spindle motor  
 driving through a timing belt drive.

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 7", the Leland-Gifford No. 24C electro-  
 mechanical gun drilling unit can be  
 furnished with 12", 24" or 36" stroke.  
 Driven by a 1 1/2 hp Dynabreak motor  
 through a non-slip timing belt, the  
 spindle can be run at speeds from 720  
 to 12,000 rpm with a 3600 rpm motor  
 or at 360 to 6000 rpm with an 1800 rpm  
 motor. Feed is actuated by and syn-  
 chronized to the spindle speed and can

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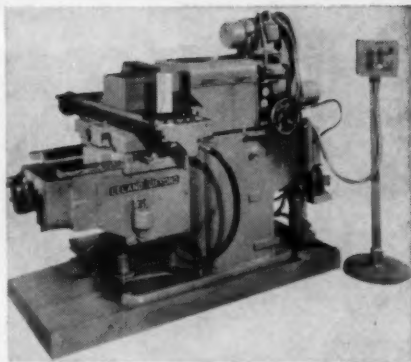
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MACHINE and TOOL BLUE BOOK

be changed through pick-off gears from a minimum of .00019" per rev. to a maximum of .0015" in increments of .000015" if desired. A separate ½ hp Dynabrade motor powers the lead screw for rapid approach, set-up and rapid return.

This gun drilling equipment can be furnished as a complete machine, or as drilling units only. Leland-Gifford Co., 1003 Southbridge St., Worcester 1, Massachusetts.

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*Could an*  
**E-X-P-A-N-D-I-N-G PLUG GAGE**  
*solve a gaging problem for you?*

The Comtorplug expansion principle is unique ... and proven. Hundreds of U. S. precision-production programs use it, including several of the very largest. The unique expansion plug gives true 2-point gaging. You see actual diameter in a fixed reading to fraction of .0001". You measure front or back taper exactly, also ovality, bell mouth, etc. Centering, alignment and pressure are automatic, allowing accurate use by all types of personnel.



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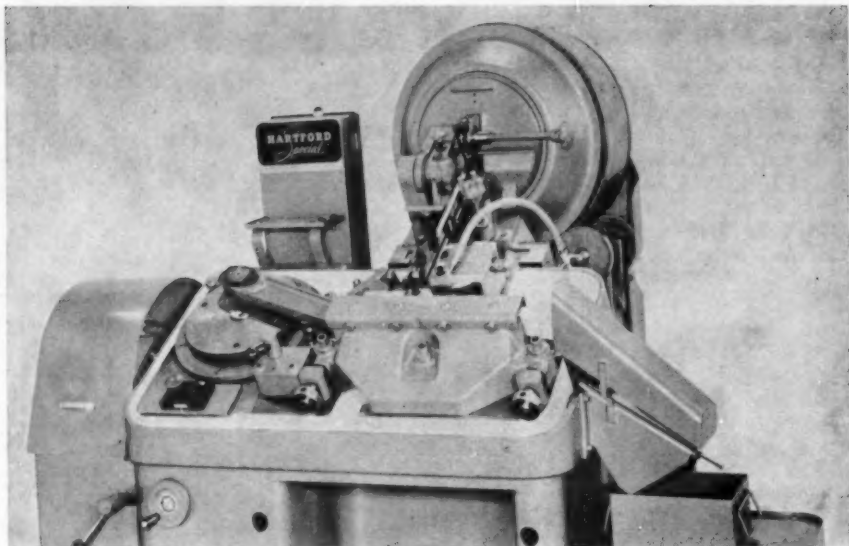
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DRILL ANY NUMBER  
OF HOLES . . . IN  
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IN ANY MATERIAL . . .  
ON ALL CENTERS!

Drill a maximum number of holes in one pass—as close as twice drill diameter. Zagar heads are built as a complete unit or may be adapted to any standard drill press.

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**Zagar** **TOOLS FOR INDUSTRY**  
and SPECIAL MACHINERY

## EASIER SET-UP FEATURED ON AUTOMATIC THREAD ROLLER

An automatic thread rolling machine introduced by Hartford Special Machinery is capable of producing 135 to 400 pieces per minute. Thread lengths may be rolled from  $\frac{1}{8}$ " through  $1\frac{1}{2}$ " and can be extended through 3" with special dies. Screw capacity is from No. 2 through No. 10 on the automatic model (400-R) and No. 0 through No. 10 on a manual model (400-M).

Simplified design makes for faster, easier set-up, as well as reduced maintenance time. Adjustable starter fingers are featured in which the height and stroke can be varied. A simple eccentric cam adjustment controls the relative position of the moving die for easy die matching.

The new models feature straight line feed rails. A simple mechanical type feed rail vibrator assures uninterrupted feeding of blanks.

The Hartford Special Machinery Co., Simsbury, Conn.

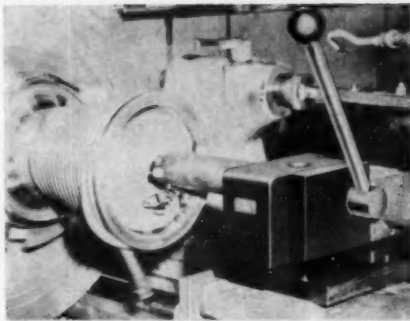
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## TOOL POST AND TOOL ADAPTERS FOR EVERY LATHE OPERATION

Kirkelie's line of lathe tool holders is designed to cover all models and all sizes of engine and turret lathes—even up to 60" swing.

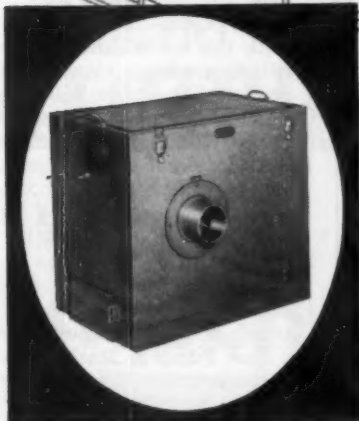
On a production run, it is necessary only to have the proper tool adapter ready for each cut. Then, in any desired sequence, the tool adapters can be quickly set, positively locked and



## DUSTKOP "520"

Designed to collect dust from  
single machines

portable —  
easily installed



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STOPS DUST**

Self-contained Dustkop models like the "520," are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand

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**NEW DUSTKOP AUTO SHAKER**  
shakes filters AUTOMATICALLY

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details

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## New \$300 precision cut-off saw paid for itself in 15 minutes

Navkut\*, the new precision cut-off saw, cut production costs of "spacers" substantially at Unicorn Engineering Inc. (now owned by Computer Measurements Co., Sylmar, Calif.) The cost of spacers was reduced from \$8 to 80¢ each by Navkut's simple cut-off operation. During every 15-minute production run, the Navkut saw paid for itself. Such results aren't unusual with Navkut, the saw that can cut parallel tolerances to within .002" in ferrous, non-ferrous, wood, and plastic materials with only two types of blades. Usually the cut finish and accuracy will be so precise there is no need for milling or grinding. All this, yet the Navkut saw costs only \$300. See for yourself how it can save you money. Write today for a free 15-minute demonstration in your shop.

\*TRADEMARK

Navkut saw is another product marketed by:



### NAVAN PRODUCTS INC.

Subsidiary of  
North American Aviation, Inc.  
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El Segundo, California

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then easily lifted from the tool post after the cut is made.

Clamping or locking of the tool post is spring-actuated to allow rapid interchange of tool adapters.

George E. Kirkelle Co., 8717 Darby St., Northridge, Calif.

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## PROFILER HAS TILTING TABLE

Rice Pump & Machine's redeveloped line of profile grinders extends the range of precision grinding to include grinding of die clearances, cams and contours plus a wide variety of finish grinding work. Some of the newly added features include a hinged access door to facilitate interior maintenance and a larger serrated table of 12" x 13½" with a 4-way tilt.

The center-line of the table coincides with the center-line of spindle so that grinding wheels always operate in the center of the table hole at all working angles. Spindle speeds are available in 20,000, 30,000 and 35,000 rpm ranges for the single speed machines and in 20,000-30,000 and 20,000-35,000 rpm for two speed machines. ½ hp, 3450 rpm motors are standard; ¾ hp motors are optional. These grinders are basically the bench type, but may be mounted on a pedestal or four-legged floor stand which the manufacturer provides.

Rice Pump & Machine Co., Belgium, Wisconsin.

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## COMPACT, SELF-CONTAINED ULTRASONIC CLEANER

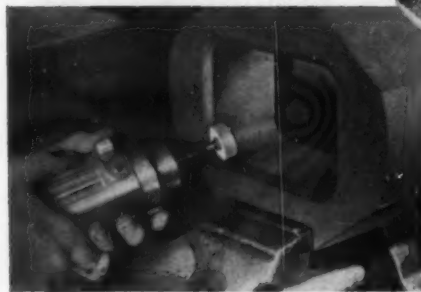
Both the generator and cleaning tank of this ultrasonic cleaner are housed in a one-piece stainless steel wrap-around cabinet. Only simple controls are needed to operate this 250-watt unit. Specifications: capacity of 3 gal.; and a 10" by 14" by 6" cleaning compartment.

National Ultrasonic Corp., 111 Montgomery Ave., Irvington 11, N.J.

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# A NEW ELECTRIC HAND GRINDER



Weights only 3¼ lbs. Power input: 250 Watts continuous. Spindle speed: 25,000 r.p.m., no load.



GE/USL 33/1

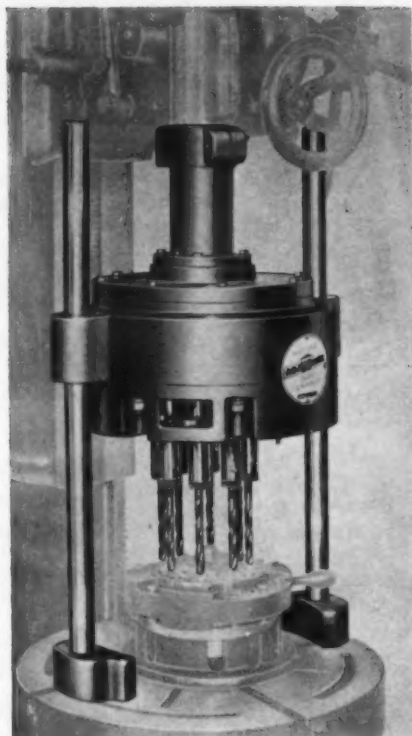
**LESTO**

Small, useful and powerful, this heavy duty grinder is indispensable in the manufacture of die-casting, stamping and tooling. Grinding applications are unlimited with this Swiss precision-made tool.

For complete information, see your dealer or write:

**VICTOR J. KRIEG, INC.**  
Precision-made power tools of unsurpassed performance  
P. O. BOX 7, 1 DEPOT PLAZA, MAMARONECK, N. Y.

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#### **MULTIPLE SPINDLE HEAD USES DRILL PATTERN PLATES**

Flexibility is stressed in describing a multiple spindle drill head now offered by United States Drill Head Co. called the Adjustafix, this head is

actually a fixed center type which can be easily changed to different hole patterns. It is readily installed on standard or special machines now in use, and affords great flexibility for drilling, tapping, reaming, spotfacing, boring, counterboring, and milling operations.

Basic design provides a main drive box and a demountable pattern plate. A complete engineering changeover may be quickly made, leaving as much as 90% of the head intact! When changing to another job, only the pattern plate is changed and the spindles and idlers are relocated on the new pattern plate to conform to the new design. Spindle and idler construction are entirely separate self-contained assemblies so that tool speed required for a given job is obtained without any change of gearing in the main drive box.

United States Drill Head Co., 5298  
River Rd., Cincinnati 33, Ohio.

Use postpaid card. Circle No. 122

#### **FLAT BLANK FEEDER**

A fully automatic, high-speed stack-top feeding machine for flat metal blanks of all sizes and shapes, and in small or large lots is now being built by Clark. It has a one-at-a-time magnetic pick-up of blank from the top of the workstack. Powered, magnetic rolls and magnetic belt transfer the blanks from pick-up to operating machine.

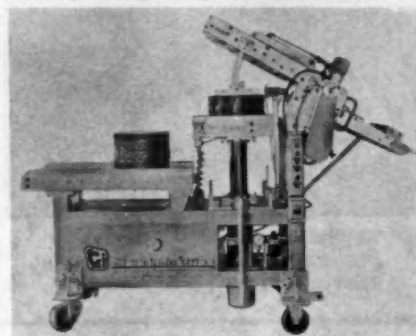
#### **DRESS CENTERS FAST—ECONOMICALLY WITH ABRASIVE CENT-R-LAP TOOL**



Eliminates time and dust of diamond dressing • Removes scale • Laps without chatter. Sold in three sizes direct to consumer. Send for literature and prices.

**J. R. REICH MFG. CO.**  
P.O. BOX 2152 DAYTON 29, OHIO

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MACHINE and TOOL BLUE BOOK

This self-contained caster-mounted unit permits quick removal for die change or shift from one operating machine to another. The feeder has operating speeds up to 100 parts per minute.

Clark Industries, Delaware, Ohio.

Use postpaid card. Circle No. 123

### COMPACT PUNCH & DIE SHARPENER IS PORTABLE

Simplicity of design and operation are features of a portable, bench-type grinder from Punch Products. The grinder provides a convenient method for sharpening most makes and types of standard and special punches and dies.

Outstanding features include: convenient handle to swing punches and dies across the grinding wheel; precision machined vee holder at 90° to wheel; knurled feed handle to aid fine feeding of work to wheel; and increments of .500" are scribed on handle

Another

## VICTOR VALUE

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### DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
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1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order Today—Immediate Shipment from Stock!

VICTOR MACHINERY EXCHANGE, INC.

Dealers in Tool Room Equipment

Dept. B, 251 Centre St.  
New York 13, N.Y. Tel.: CAAnal 6-5576

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MASTER WORKMANSHIP REQUIRES

# MASTERHEADS

"THE  
PRECISION  
HEAD"

BORING · TURNING · RECESSING · UNDERCUTTING · TAPER CUTTING



## WOHLHAUPTER UNIVERSAL FACING AND BORING HEADS FEATURE:

- Automatic Feeds and End Release
- 9 Sizes to 36 1/4"
- 12 Feeds in 0.0008" Increments

Increase the capacity of any machine without facing facilities.

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Sole Agent for U.S.A. **KARL A. NEISE, Inc.**  
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ONE OF MANY  
**NEISE**  
MODERN TOOLS

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## RAISE GRINDING PRODUCTION



**FOR \$2.70**



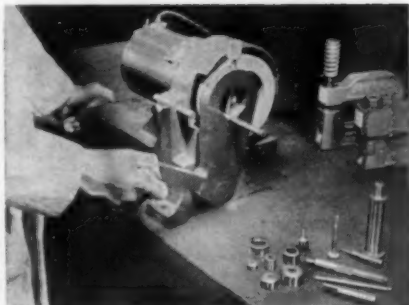
A typical Desmond Huntington grinding wheel dresser costs about \$2.70 from your distributor, yet it substantially increases grinding production, makes wheels cut better, and lowers grinding costs. By dressing all your grinding wheels regularly you remove inefficient dull particles and loaded metal, expose a fresh new grinding surface. Your Desmond distributor can furnish the exact model you require. Ask his advice.

*The only complete line of  
grinding wheel dressers and cutters*

### **Desmond**

**The Desmond-Stephan Mfg. Co.  
Urbana, Ohio**

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hub for accurate control of feeding. The grinder has a  $\frac{1}{2}$  hp, 3450 rpm motor.

Punch Products Corp., 370 Babcock St., Buffalo 6, N.Y.

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### **LOW-COST MILL FOR HYDRAULIC DUPLICATING**

A special vertical milling machine for hydraulic duplicating has been developed by U.S. Burke Machine Tool Co. Built from the company's standard components, the mill is built to sell for less than similar machines used for hydraulic duplicating, according to the builder.

Extra rigidity is acquired by raising and lowering the knee to follow the contours of the master rather than actuating the quill. The heavy knee cylinder is mounted in place of a conventional vertical feed screw, and



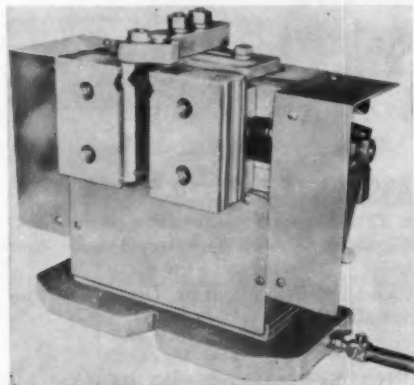
manual vertical knee feed is retained to facilitate set-up.

Air hydraulic longitudinal feed to the table is available with either manual or automatic air-operated and mechanically controlled in-feed. In the case of air operation, the table is fed in automatically the pre-determined amount at the conclusion of each longitudinal stroke.

Table sizes are available from 10" x 36" to 10" x 54" in 6" increments.

U.S. Burke Machine Tool Co., Cincinnati 27, Ohio.

Use postpaid card. Circle No. 125



#### WORK-HOLDING JIG PNEUMATICALLY OPERATED

An automatic self-centering work-holding device that operates from a shop air line has been announced by Heuser. This "Sure-Center" is claimed to be ideal for drilling, tapping, milling, counterboring, and reaming, as well as screw machine secondary operations on round, hex, or square stock, standard or odd-shaped smooth or rough castings.

It has two movable gibbed master jaws, working from levers connected to a cam which will repeatedly center a piece part within .0015" or better.

Heuser Mfg. Co., 1638 N. Paulina St., Chicago 22, Ill.

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## LINLEY JIG BORERS

Give You Maximum  
Utility—At Low Cost



The improved Linley Jig Borers are more efficient than ever. Accurate and fast in operation—easy to set up. Made for the exacting requirements of small part precision work. Using Linley Jig Borers allows larger capacity borers to be used where intended, on heavier jobs. Once you've installed a Linley, you'll wonder how you got along without it in your shop.

Table Size: 7" x 17½"  
Table Travel: 6½" x 10"

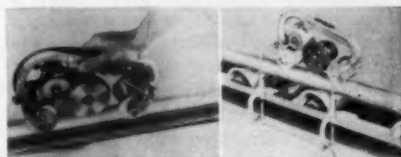
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details.

### LINLEY BROTHERS CO.

JIG BORERS - RIVET SPINNERS  
663 State St. Ext., Bridgeport 1, Conn.

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## BAR and TUBE PRINTER for hand or conveyor use



Rolled by hand along rounds or flats, or mounted over conveyor rolls, this printer provides simple, economical identification code printing. Guide rolls adjust and center printing wheel for clear marking on metal or plastic ¼" diameter up.

Wheel accepts E-Z Set rubber type in single type characters or complete legend in one strip. Easily pressed into place, or stripped off for quick change.

Sponge rubber ink roll holds enough ink for 8 hours; easily interchanged for color code change.

Lightweight magnesium frame, rugged construction; weight 7½ lbs. Write for literature, Model T-55.

### PANNIER MASTER MARKERS

264 Pannier Bldg., Pittsburgh 12, Pa.

Use postpaid card. Circle No. 421



#### **DRILL WITH 32-SPINDLE TURRET IS DIRECTED BY NUMERICAL CONTROL**

A numerically controlled Fosmatic turret drill, with a single complement of tools in its 32-spindle turret, is reportedly able to perform about 90% of all the drilling-tapping jobs in the average shop.

The drill's 32 spindles can store drills, reamers, taps, milling cutters, and counterbores needed for hundreds of different jobs. Positioning and turret selection are controlled by a General Electric system providing system accuracy of plus or minus .001".

The Fosmatic turret drill features 3 hp, enough to handle a 1½" drill in cast iron and still is capable of tapping a No. 2-56 thread. The spindles have 8 feed rates from .001"/rev. to .030"/rev., and 16 speeds ranging from 65 to 2500 rpm. Spindles available are drilling spindles, lead screw tapping spindles and heavy duty spindles for milling.

The table is 18" x 34" and has 18" x 24" of travel. Table top to spindle nose

is 23". Zero offset permits positioning the workpiece at any location on the table.

The Fosdick Machine Tool Co., Cincinnati, Ohio.

Use postpaid card. Circle No. 127

#### **"SHOCKPROOF" NYLON DRILL**

The new No. 1144 ¼" Safe-T-Drill is said to have the advantages of greatly increased safety through double insulation, double protection and strength through insulated chuck and Nylon housing, and light weight.

The drill serves as a power unit for a complete 14-tool power workshop with a motor rated at a full 2.7 amperes. Drill turns into many other useful power tools with on-and-off-in-seconds Quik-Change attachments. It drives easily attachments such as a 5½" circular saw, hedge trimmer and finish sander. Other units include a portable and bench sabre saw, bench grinder, etc.

Millers Falls Co., Greenfield, Mass.

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*Star*

## PROFILE GRINDERS



Grind or polish contours and irregular shapes fast, economically and accurately with practical floor-type machines.

- 18-in. Dia. Tilting Table
- Reciprocating Spindle
- 1/2 to 4-in. Dia. Wheels
- Three Spindle Speeds
- Diamond Dresser Attachment

*Star Cutter Company*

34500 Grand River Blvd. • Farmington, Michigan

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**KEO**



## COMBINED DRILLS and COUNTERSINKS

• Both old and new series carried in stock for immediate delivery. Finest high speed steel. Ground spiral flutes. New standard simplifies and improves size progression. New comparison chart mailed on request. Shows new standard sizes — both plain and bell type. Specials to your blue prints. We also stock Keyseat Cutters, Arbor Type Cutters, Center Reamers, Lathe Mandrels, T-Slot Cutters and Long Series Combined Drills.

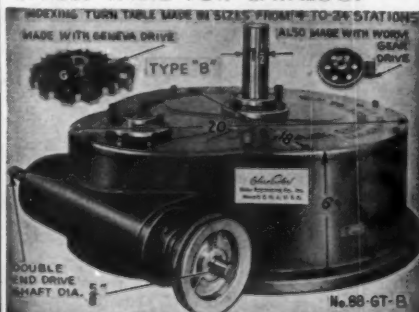
### KEO CUTTERS, INC.

25040 Easy St., Warren, Mich.  
Warehouse: 1300 S. Seto St.,  
Los Angeles 23, Calif.

Use postpaid card. Circle No. 423

## INDEXING MACHINERY — CAMS — GENEVA GEARS — TURNTABLES

EISLER MAKES OVER 300 DIFFERENT TYPES OF INDEXING TURNTABLES SPECIAL MADE TO YOUR SPECS. WRITE FOR CATALOG.



Dr. Charles Eisler Me. Founder

Charles Eisler, Jr. Pres.

**EISLER ENGINEERING CO., INC.**

762 SOUTH 13TH STREET

NEWARK 3, NEW JERSEY

Use postpaid card. Circle No. 424



### INSERT BORING TOOL HOLDERS COME IN WIDE RANGE OF SIZES

Users of DeVlieg Microbore units can now use the hardest grades of carbide if they use either the clamp-on or screw-on style holders for throw-away inserts now available. Ceramic inserts can also be held.

Two styles are produced, type S in which a button head screw seats and holds the insert and shim assembly; and type C in which a clamp-on arrangement is used to release the shim,

chip breaker and insert for fast indexing.

The former is for general purpose precision boring operations in the smaller hole sizes down to 15/16" diameter. The latter for large bore sizes for light, medium and heavy machining. Both styles are furnished for either angular or straight mounting.

DeVlieg Machine Co., Microbore Div., Fair St., Royal Oak, Mich.

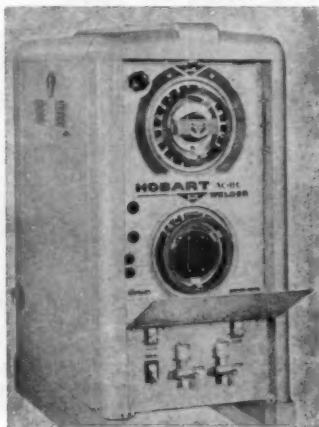
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### AC-DC INERT-GAS WELDERS

Two all-purpose welders have been announced by Hobart. Model AD1-2641 is rated at 200 amps., and AD1-3641 at 300. Both can be used for manual, automatic, tig, inert-gas spot, or mig welding.

Inert-gas facilities are built in, but a hinged top permits easy access to spark gap and timers of the high frequency stabilizer. Both models are geared with an automatic contactor opening feature, hand switch for remote control, adjustable post flow timer, automatic high-frequency control, power-factor correction, and a ballast resistor.

Hobart Brothers Co., Troy, Ohio.



Use postpaid card. Circle No. 130

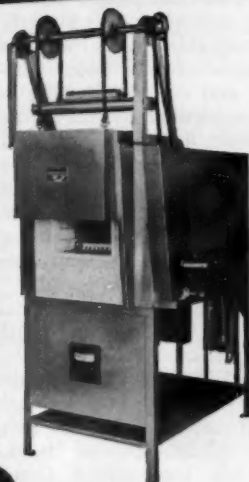
## HUPPERT

### Floor Model Furnaces

Built in 28 Standard Sizes

- Continuous operation to 1850° F.—intermittent to 1950° F.—for 2300° F. on special order.
- Complete with indicating electronic controller.
- Tight-sealing, wedge-type door.
- Standard for 220 V. AC, single or 3 phase operation—110 V. or 440 V. on special order.
- Multi-insulation for maximum efficiency.

*Request literature  
on complete line of Huppert Furnaces*



Model No. 16 Illustrated

### K. H. HUPPERT CO.

Manufacturers of Electric Furnaces and Ovens

6845 Cottage Grove Ave., Chicago 37, Illinois

Inside Dimensions  
12" W. x 8" H. x 18" D.  
**\$1050.00 complete**

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**BLUE  
VALLEY**

## FLANGING MACHINES and CIRCLE SHEARS

No. 1 10 Ga. Circle Shear and Flanger.

No. 3 1/4" Cap. Flanger for flat heads.

No. 4 3/4" Cap. Flanger for flat and dished heads.

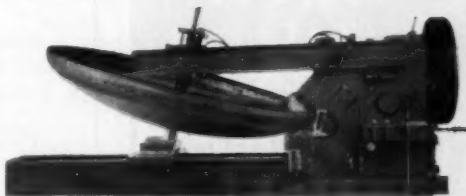
No. 5 1/2" Cap. Flanger for flat and dished heads.

No. 6 3/4" Cap. Flanger for flat and dished heads.

No. 56 Model 3/16" Cap. Elliptical Head Shear and Flanger.

No. 60 3/4" capacity circle shear with a 23" throat.

No. 40 1/4" capacity circle shear with a 15 1/2" throat.



Above machine a No. 7, 3/4" capacity. Shown with a 1/4" x 9" 6" dia. stainless steel head with a 6 1/2" knuckle radius. Can go up to as high as an 8" knuckled radius.

## BLUE VALLEY MACHINE & MFG. CO.

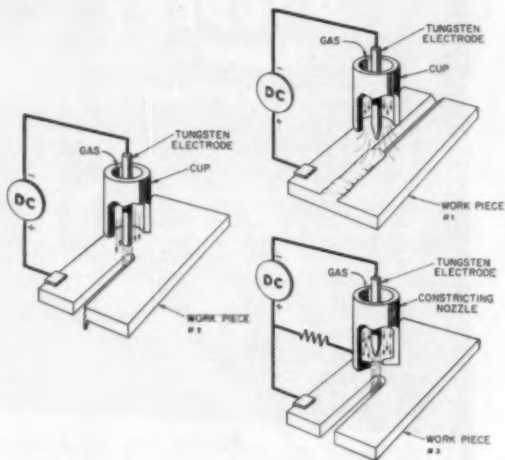
6832 Truman Road KANSAS CITY 26, MO.

Use postpaid card. Circle No. 426

## TUNGSTEN INERT GAS SHIELDED TORCH WELDS AND CUTS

Linde Company's standard line of tungsten inert-gas-shielded torches can now be used for both welding and cutting. Cutting is accomplished by increasing current density above good welding conditions while using argon-hydrogen mixtures. Normal gas flow rates (40 to 60 cfh) transfer energy across arc and displace the molten metal.

DC power equipment, with a 70-volt open circuit can be used for metals  $\frac{1}{8}$  to  $\frac{1}{2}$ " thick. Cutting speeds are 40 to 60 ipm on  $\frac{1}{8}$ " aluminum and 20 to 40 ipm on  $\frac{1}{8}$ " stainless steel. Linde's mechanized Constricted Arc cutting method continues to be recommended for applications where high-speed and quality are critical in materials up to 4" thick.



Linde Corp., Div. of Union Carbide Corp., 270 Park Ave., New York 17.

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# Nielsen

## HEAVY DUTY

### Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

**NIELSEN, INC.**  
LAWTON, MICH.

WRITE FOR CATALOG ON LIVE CENTERS

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## COMPARATOR SPEEDS SETTING TOOLS IN HOLDERS

An optical tool setting comparator developed by Pratt & Whitney is designed to meet the need for a gage





to set tool position in adapters for use in numerically controlled machines or other machines using pre-set tooling.

Primarily used to set tool depth and diameter, the comparator also is capable of checking tool run-out and cutting edge condition.

The instrument is a combination comparator and direct setting device. It uses a set of gage blocks and end measures for even inch settings. Increments of an inch are set by micrometer head. Tool point positioning is observed through a microscope with exact positioning made by fine micrometer adjustments.

Maximum depth and diameter capacities are 12" and 6" respectively.

Pratt & Whitney Co., Inc., West Hartford 1, Conn.

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## SPELLMACO "SPOTTERS"

A matched set of transfer punches  
for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled  
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for  
long life—0025 undersize to facilitate use—Black oxide finish  
Set No. 3-17, 28 punches with indexed stand—size 3/32" to 1/2", by 1/64"—  
plus handy 17/32" size. Length 4-7/8" ONLY \$19.40

Single sizes available

**R. L. SPELLMAN CO. - URBANA, OHIO**

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## New American Standard's PRECISION SURFACE GAGE

PATENT PENDING

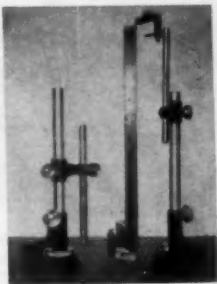
The exceptionally smooth fine adjustment is in a vertical plane and all backlash is virtually eliminated. Working range is from Zero to 20" in height. With the use of an extension rod any height may be measured.

A sturdy well built tool. Weight 6 lbs. Even extended to 20" in height, you will be able to work with confidence and repetition with a .0001 indicator.

PRICE

**\$20.00**

Without Indicator



**AMERICAN STANDARD  
COMPANY**

PLANTSVILLE, CONNECTICUT

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## GEARS

In Stock—Immediate  
Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 18a

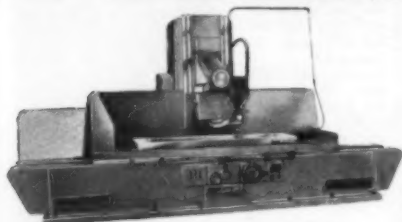
**CHICAGO GEAR WORKS**

440-50 N. Oakley Blvd., Chicago 12, Ill.

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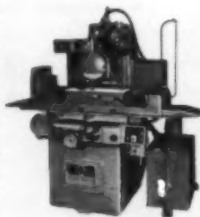
# FOR

## MAXIMUM PRECISION IN TOOLROOM OR PRODUCTION GRINDING



**MODEL F HYDRAULIC FEED SURFACE GRINDER** a production type with cross sliding head, built in sizes ranging from 12" x 18" x 48" to 30" x 25" x 120". Heavy, powerful grinder with maximum table speed of 150' per minute. Motor mounted directly on grinding wheel spindle to assure full power is transmitted directly to wheel. Automatic feeds in increments from .0001" to .001" per reversal available.

**NO. 360 HYDRAULIC FEED SURFACE GRINDER.** A precision toolroom type which offers absolute accuracy with microinch finish at production speeds. One-piece column and base, infinite longitudinal table speeds from 3" to 120' per minute, variable speed cross feed. Available with new incremental downfeed with automatic spark-out after preset stock removal.



**NO. 10 UNIVERSAL CUTTER AND TOOL GRINDER** built to meet the need for a high grade machine of medium capacity at a moderate price. Combines rigidity with maximum convenience of operation. Head swivels 360°, locks in any setting; table swivels 90°. Hand operated longitudinal movement. Two spindle speeds.

## FIVE NEW GRADES OF CEMENTED CARBIDES

Newcomer Products, Inc., Latrobe, Pa., has announced the development of five new grades of cemented carbides, called NewBide, with a Rockwell (A) hardness ranging from 91.2 to 93.0 and with transverse rupture strengths from 225,000 to 325,000 psi.

N-20 is a fine grain, high tensile general purpose grade for machining cast iron and non-ferrous materials. It has added greater crater resistance for the alloy types of cast iron, according to the company, than comparable standard grades.

N-50 is recommended for heavy cuts on steel and as a premium general purpose grade—an extended range carbide with excellent resistance to mechanical and thermal shock as well as good wear resistance.

N-60 is specially designed for general purpose machining of steel under normal conditions. It is described as having less shock resistance, but greater wear resistance than the N-50 grade.

N-70 is a general purpose finishing grade for moderate cuts at relatively high speeds, and N-80 is a premium high speed finishing and precision boring grade offering extreme wear, crater and thermal shock resistance.

Use postpaid card. Circle No. 134

## PILOT CONTROL REGULATES INACCESSIBLE AIR LINES

Remote regulation of inaccessible air lines is possible with Hannifin Crown's pilot-controlled regulator. A column of air replaces adjusting screw and spring.

The regulator can control air flow in large pipes, provide different pressures to a single tool or cylinder, and maintain stability in downstream pressure-sensing systems.

# GRAND RAPIDS

Hannifin Co., Dept. 130, 501 S. Wolf Rd., Des Plaines, Ill.

Use postpaid card. Circle No. 135



#### GRADUATING MACHINE MARKS CALIBRATIONS ON METAL TUBING

The No. 598 manually operated graduating machine marks accurate calibrations on aluminum, brass, and other metal tubing. A single rotation of the 8" diameter marking wheel provides fractional graduations on a 24" tube. The operating handle is balanced to hold in any position. All operating parts are safely covered, but are easily reached for changing the marking wheel or other servicing.

Dimensions of the easily-operated machine are 48" left to right x 16" high x 10" thick.

The Acromark Co., 15 Morrell St., Elizabeth, N. J.

Use postpaid card. Circle No. 136

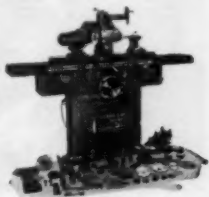
#### IMPROVED SINE-LINE LEAD CHECKER

The Model 1218-A lead checker incorporates optical instrumentation for setting both the universal sine bar and an angular dividing head. Angles can

# YOU

## CAN FIND THE RIGHT MACHINE FOR YOUR NEEDS ON THESE PAGES

**NO. 60 UNIVERSAL CUTTER AND TOOL GRINDER** offers precision sharpening, fast set-ups and low maintenance. Designed for maximum convenience of operation, with work weight carried directly over base, permitting operator to stand close to work. Master hand wheel provides three speeds of longitudinal table travel.



**NO. 20 HAND FEED SURFACE GRINDER** has hand wheels for vertical and longitudinal table movement to assure toolroom precision and exceptionally fine finish. One-piece column and base, greased-for-life ball bearing spindle. Available with portable, motor driven coolant system.

**NO. 1230 HYDRAULIC FEED O. D. & I. D. GRINDER** meets the needs of users requiring a machine that does both internal and cylindrical grinding. It is a rugged, precision tool capable of taking rough cuts as well as producing the finest finish. Has a host of controls and adjustments for maximum convenience and versatility of operation.



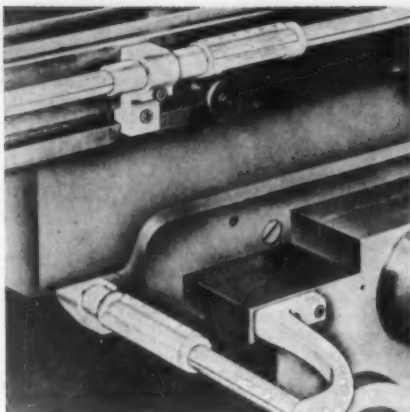
A note on your letterhead will bring full details. Please specify the type of grinder you are most interested in.

**GALLMEYER & LIVINGSTON CO.**  
405 Straight Ave., S. W., Grand Rapids, Mich.

# GRINDERS



Use postpaid card. Circle No. 431



be set within 0.001" degree without use of gage blocks.

With new components incorporated in this lead checker, it is possible to do conventional continuous checking, or increment checking through use of the scale on the tailstock. Leads of external or internal helical, spur and herringbone gears, and worms can be checked from zero to infinity. Tooth spacing can also be checked with the dividing head.

Gears with pitch diameters up to 18" can be checked with repeatable accuracy of 0.0001". Maximum distance between centers is 24".

Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Use postpaid card. Circle No. 137

#### REDESIGNED LAPPING MACHINE

The 24" Lapmaster features a new abrasive distribution system which maintains constant mixture of compound to vehicle. Adjustable flow control assures uniform deposit at lapping stations. Air lifts speed loading and unloading of small- and medium-sized parts. A sensing head detects whether lap plate is convex, flat or concave, and registers on a control panel.

Open-faced models, without pneumatic lifts, are available with or without the sensing head equipment.

Crane Packing Co., Dept. MB-3, 6400 Oakton St., Morton Grove, Ill.

Use postpaid card. Circle No. 138

#### EDGCOMB VERNIER SCALE ATTACHMENT

Accuracy within .0002" in positioning and relocating points on milling machines, lathes, and similar equipment is provided with the Edgcomb Evertrue vernier scale attachment. It enables close tolerances to be held on older machines by providing the means to overcome errors due to backlash and worn lead screws.

This attachment is available for table lengths from 1" to 15" and is adaptable for 1-, 2-, or 3-axis operations. Prices start at \$220.

Edgcomb Engineering and Engraving Co., 1105 N. Hollywood Way, Burbank, California.

Use postpaid card. Circle No. 200

#### MILLING SPINDLE'S TORQUE INCREASES AS SPEED DECREASES

Compactness and variable spindle speeds at constant horsepower are features of Colonial Broach & Machine's new line of Hydraulic Constant Horsepower Milling Spindles.

The manufacturer points out that the spindles obtain time saving results because maximum chip loads per tooth can be used regardless of spindle speeds or cutter diameter.

The "standard" spindles offered range from 10 to 50 HP. Larger and smaller units are also available. A 15



# REVOLUTIONARY



## new type

### diamond grinding mandrels

Our Mandrels are made with exclusive high vacuum bond.

V.R.C. Mandrels contain a high concentration of diamond powder completely through to center. Ours are **not** of the standard single layer plated type. This process results in a greater economy through longer wheel wear. Enables extremely free cutting.

#### Applications:

Internal grinding, jig grinding of carbide dies, hardened steel, ceramics. Suitable for Pratt & Whitney, Moore, Dumore and similar types of equipment.

Sizes—1/16" to 1/2". Shank size to your specifications.

Write for catalog containing data and prices.

Distributors and export inquiries invited.

## Vacuum Research Corp.

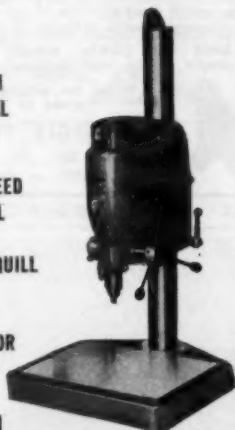
Mfg. of Industrial Diamond Tools  
70 Austin St., Forest Hills, N.Y.  
Telephone: BO 1-5687

Use postpaid card. Circle No. 433

April, 1961

## Announcing the **EM 605** PRODUCTION DRILL PRESS at new **LOW PRICE!**

- EXCLUSIVE E-M  
DRILL-MATERIAL  
CHART
- FINGERTIP SPEED  
SELECTOR DIAL
- INSTANT-SET QUILL  
DEPTH STOP
- BUILT-IN MOTOR
- HEAVY  
CONSTRUCTION



Designed especially for those production jobs requiring a wide range of work plus accuracy and speed. Includes many features of the popular T-M Tool Room Model. 600 to 4,000 RPM. Table and Bench Models.

Write for **FREE Literature**

**THE ELECTRO-MECHANICAL CO.**  
263 E. Erie Street, Milwaukee 2, Wisconsin

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## MAGNETIC Sine Plates



Model No. 1900M

### COMPOUND AND SINGLE ANGLE

New Dual Field permanent magnetic chucks with extra holding power. Positive lock on each axis.

The new Dual Field permanent magnetic chucks with a center T slot, allow either side to be magnetized independently. All models are accurate to .0002" in dimensions and parallelism. A .2000" recess is provided for small angles.

OTHER MODELS include 5" and 10" sine bars and plates, single and compound angle, plain and magnetic.

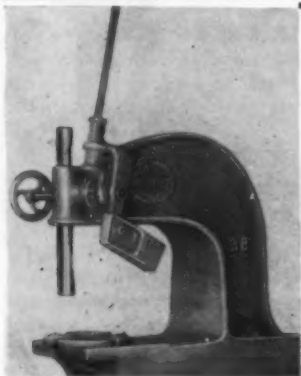
Write for catalog and economical prices on full line.



### BALD EAGLE PRODUCTS DIV.

356 Cedar St. • St. Paul 1, Minn.  
For Quality — Specify Bald Eagle

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Use 3B (simple lever type) or 3 BR (ratchet type) Presses for work up to 33" diameter. Maximum 3 Tons Pressure and 12" Daylight.

Write for Catalog 8-42 or see your dealer for more specifications.

*Greenard* ARBOR PRESS CO

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### REAMER BUSHINGS

Mueller Industries has developed a line of reamer bushings to provide greater accuracy for stub screw machine reamers. The design corrects for out-of-parallelism of turret and spindle, indexing inaccuracies, and hole run-out in the workpiece.

Mueller Industries, 510 E. Rand Rd., Mt. Prospect, Ill.

Use postpaid card. Circle No. 139

### CARBON-DIOXIDE SHIELD FOR WELDING STEEL

Air Reduction Sales Co. has introduced a welding process which uses carbon dioxide and low-alloy steel welding wire to join mild steel, called Aircomatic CO<sub>2</sub> Sprayarc. Sound welds can be made with direct current or straight polarity, using CO<sub>2</sub> shielding gas. About 32 volts are recommended for most work.

Air Reduction Sales Co. a division of Air Reduction Co., Inc., 150 E. 42nd St., New York 17, N.Y.

Use postpaid card. Circle No. 140

Magnetic  
Base  
Tool  
Holder

### 21 MAGNETIC TOOLS

11  
Permanent  
Magnets—  
Various  
Sizes  
and Types

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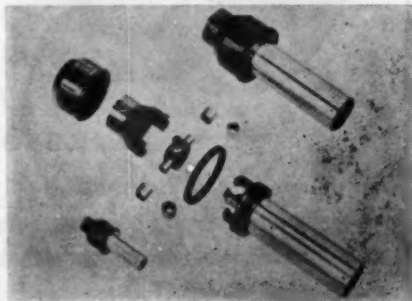
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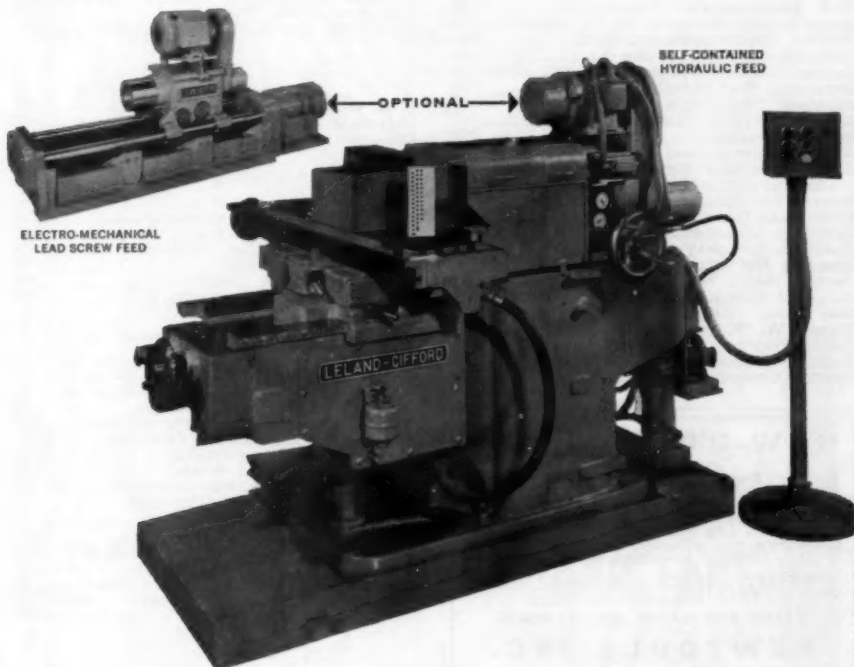
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0	70-72-76-80	1/2	12-13-14-16-18-20-24-27-28-32-36-40	1-13/16	6-10-12-14-16-18-20-24-32
1	48-56-64-72-80-90	9/16	12-14-16-18-20-24-27-28-32-36-40	1-7/8	5-8-10-12-14-16-18-20-24
2	48-52-54-56-64-72-80	5/8	10-11-12-14-16-18-20-24-27-28-32-36-40	1-13/16	5-8-10-12-14-16-18-20-24
3	40-44-46-48-56-60-64	11/16	10-11-12-14-16-18-20-24-27-28-32-40	2	8-10-12-14-16-18-20
4	32-36-40-48-56-60-64	3/4	10-11-12-14-16-18-20-24-27-28-30-32-36-40	2-1/16	12-14-16
5	30-32-36-40-44-48-56-64-80	13/16	10-12-14-16-18-20-24-27-32	2-1/8	8-10-12-14-16-18-20
6	30-32-36-40-48-56-60-64	7/8	9-10-12-14-16-18-20-24-27-28-32-40	2-3/16	10-12-14-16
7	28-30-36-40-48-56-60-64	15/16	8-9-10-12-14-16-18-20-24-27-32-40	2-1/4	4 1/2-8-10-12-14-16-18
8	24-30-36-40-44-48-56-60-64-80	1	8-10-12-14-16-18-20-24-27-32-40	2-5/16	12-14-16-18
9	24-28-32-36-40	1-1/16	10-12-14-16-18-20-24-27-32	2-3/8	10-12-14-16-18
10	28-30-36-40-48-56-60-64	1-1/8	7-8-10-12-14-16-18-20-24-27-32-40	2-1/2	4-8-10-12-14-16-18
12	20-22-24-28-30-32-36-40-56-60	1-3/16	8-10-12-14-16-18-20-24-27-32	2-9/16	12-14
14	20-24-28-32-40	1-1/4	7-8-10-12-14-16-18-20-24-27-32	2-5/8	8-10-12-14-16-18
1/16	60-64-72	1-5/16	6-8-10-12-14-16-18-20-24-27-32	2-3/4	4-8-10-12-14-16
5/64	72	1-3/8	8-10-12-14-16-18-20-24-27-32	2-7/8	8-10-12-14-16
3/32	36-48	1-7/16	8-10-12-14-16-18-20-24-27-32	3	4-8-10-12-14-16
1/8	32-36-40-44-48	1-1/2	6-8-10-12-14-16-18-20-24-27-32	3-1/4	8-10-12-14-16
5/32	32-36-40-44-48	1-5/8	6-8-10-12-14-16-18-20-24-27-32	3-1/2	8-10-12-14-16
3/16	20-24-28-32-36-40-48	1-11/16	6-8-10-12-14-16-18-20-24-27-32	3-3/4	4-8-10-12-14
7/32	20-24-28-32-36-40			4	8-10-12
1/4	14-16-18-22-24-26-27-28-30-32-36-40-48-56-64				
9/32	16-20-24-27-28-32-40-64				
5/16	16-18-20-22-24-26-27-28-30-32-36-40-48-64				
11/32	20-28-32-40-48				
3/8	12-13-14-16-20-22-27-28-30-32-36-40-48				
13/32	16-20-24-32				
7/16	12-14-16-18-20-24-27-28-32-36-40				

### HIGH SPEED LEFT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
0	80	3/8	16-24-32	1-3/8	6-8-10-12-16-18-20-24
1	56-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	56-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	56	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	32-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-30-32-40	7/8	9-12-14-18-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12	2	4 1/2-10-12
5/16	18-20-24-28-32	1-1/4	7-12-16-18		

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## Don't Overlook These Features

- ✓ **America's Amazing Abilities** well describes the work of Henry Viscardi, Jr., president of Abilities, Inc. BLUE BOOK'S editor, Ed Altholz, interviews Viscardi to report on the latest thinking of this leader in the hiring of the disabled. ....Page 102
- ✓ **Chipless Machining** is the subject of a new regular column in BLUE BOOK. The series will be written by Charles H. Wick. This month's column outlines what chipless machining is and how it fits into today's production processes .....Page 128
- ✓ **There's No Need To Postpone Numerical Control**, says managing editor Jim Pond, if tape preparation is holding you back. The reason is simple; tape preparation services are now available to industry. This article describes one such service. ....Page 118

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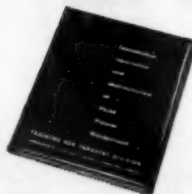
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## One Last Word

**B  
B**  
**17**

### *Is the U.S. Losing the Race?*

Anyone interested in America's economic future looks with horror on the implications of the January shipments of the American machine tool builders. These implications are shocking. How does anyone, having his country's welfare at heart, sleep soundly at night?

Shipments of all types of metal cutting machine tools totaled \$35.5 million. Of these \$14.5 million were foreign shipments, or a whopping 41%. The balance, or \$21 million, were domestic shipments. The implications which worry us lie in the ratio of foreign to domestic orders.

Why are foreign industries, especially European automotive, plunking down hard cash for American machine tools? Primarily, because the European machine tool industry, producing to capacity, cannot meet the demand. (By contrast, our own machine tool industry is below 50% of capacity.) The significant point is this: foreign industries are expanding and modernizing so rapidly that their own machine tool industry cannot meet the programs of their industries.

With the exception of the U.S., all industrial nations are arming for an assault on world markets, including our own domestic market.

With the exception of the U.S., all industrial nations are modernizing their facilities, replacing their equipment so

that the world's needs for products of every kind and description will be satisfied.

The U.S. is not modernizing at the rate it should, it is not replacing obsolete clunkers, it is not reinvesting in productive equipment and facilities. The climate, tax-wise, for modernization and capital expenditures has not only been poor, it's been criminal.\* Thus we see foreign customers buying our machine tools, in addition to their own, to increase productivity; at the same time we run around, spread gloom, complain, and let the old clunkers rattle around for another five years.

The goods and products which foreign nations will produce economically with our tools will haunt us. The import picture (and we have no fight with importers, believing, as we do in free trade) will be black for American business and for the American worker.

The U.S. must replace, must modernize, must grow up industrially and take advantage of new techniques, it must forge its weapons in a healthy fiscal and a sound depreciation climate. This is as urgent as finding a bucket for bailing out a water-filled boat.

\*We are encouraged by President Kennedy's awareness of this problem and by his desire to do something about it. Report of this appears on page 164.

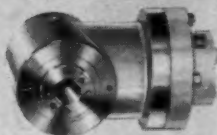
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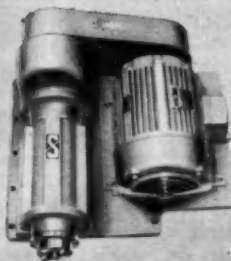


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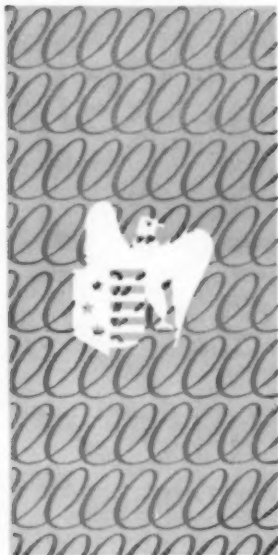


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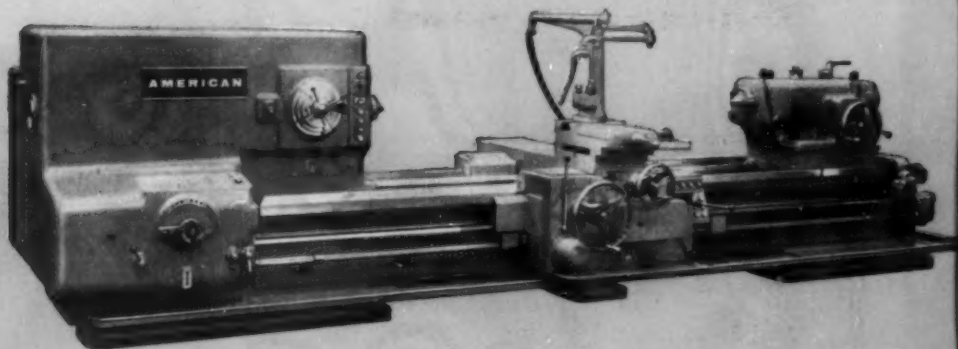




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